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MINNESOTA MEDICINE

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VOL. XII JANUARY, 1929 No. 1

REPORTABLE DISEASES IN MINNESOTA*

A. J. CHESLEY, M.D.
Executive Officer, State Board of Health
Saint Paul

THE State Board regulations divide notifiable diseases into two groups: rare diseases, to be reported direct to the Board for instruction relative to control; and common diseases, which are reported to local health officers and by them to the Board. Telephonic or telegraphic reports collect are requested for poliomyelitis, epidemic meningitis and encephalitis direct to the Division of Preventable Diseases.

Measles and *whooping cough* are not reported fully, probably because people do not realize the danger and call a physician. This is serious for "No health department, state or local, can effectively prevent or control disease without knowledge of when, where and under what conditions cases are occurring."

In 1927 only 5,618 cases of measles were reported with 58 deaths, of which 37, or 65 per cent, were under five years of age. Only 1,031 cases of whooping cough were reported, with 75 deaths, of which 73, or 97 per cent, were under five years of age.

In ten years 1918-1927 of all deaths due to *scarlet fever* 42.6 per cent occurred under five years of age; measles 70.5 per cent and whooping cough 95 per cent were under five years of age.†

Vaccination for *smallpox* was so thorough as a result of the epidemic of 1924-25, when 504 deaths occurred in twenty months, that there has not been a single smallpox death since then. In 1926 there were 281 cases, in 1927 only 126 cases. The fatality of *malignant* smallpox in the epidemics of 1917 and 1924-25 was more than 25 per cent: 510 deaths in 2,033 cases. The fatality of the *mild* type of smallpox 1913-1927 was less than 0.3 per cent: 103 deaths in 37,624 cases.

Minnesota was a pioneer in applying the culture method of control in diphtheria. In October, 1894, Dr. Hewitt began routine state-wide culture examinations. Of recent years 1901 had the largest number of deaths from diphtheria—784, or 43.9 per 100,000 population.

Antitoxin was secured for local health officers at reduced rates in November, 1906. The legislature gave $5,000 for free antitoxin in 1915 when the Board established 283 distribution stations. Now there are 386 such stations where any physician can obtain antitoxin free of charge.

The general use of antitoxin reduced diphtheria deaths from 566 or 27.1 per 100,000 in 1910 to 243 or 10.2 in 1920 and to 231 or 9.0 in 1925.

Since April, 1926, when the Board first secured diphtheria toxin-antitoxin for free distribution, the reduction has been accelerated. In 1926 there were 151 deaths, a rate of 5.97, and in 1927 only 82 deaths or 3.05 per 100,000. In 1927 the Division of Preventable Diseases investigated 34 diphtheria outbreaks, received reports of 1935 cases, examined 35,792 cultures and made 314 virulence tests on guinea pigs.

Diphtheria can be eradicated if the discoveries of scientific medicine are systematically and persistently applied. Its cause and its mode of spread are known. A means for exact diagnosis, a specific remedy for treatment which also gives temporary immunity, a reliable test for susceptibility, a safe agent for producing lasting immunity are all at hand. Family physicians must immunize babies to stop the loss of child life, for 1,448, or 67.6 per cent, of all diphtheria deaths from 1918 to 1927, inclusive, were children under ten years of age, while 781, or 36.51 per cent, were

*Read before the Southern Minnesota Medical Association, Rochester, Minn., Oct. 3, 1928.

†1927 Measles: 45, or 77.5 per cent, of all deaths (58) were reported ONLY by death certificate.
Scarlet Fever: 33, or 35.8 per cent, of all deaths (92) were reported ONLY by death certificate.
Whooping Cough: 59, or 78.6 per cent of all deaths (75) were reported ONLY by death certificate.

HHW

under five years of age. In this age group the fatality rate is 13.42 or twice that of children between five and ten years.

The Minnesota State Board of Health believes that the County and District Medical Societies should initiate and actively participate in systematic county-wide diphtheria immunization work in coöperation with the health officers and the school authorities; that public schools as well as public and private hospitals and clinics should be used as inoculation centers; that special effort should be made to get parents to protect all children between six months and twelve years of age against diphtheria through the use of toxin-antitoxin.

It is suggested that the family physician make it a rule to explain to the parents at the time a baby is born that the period of greatest susceptibility to diphtheria is eighteen months to six years, that the most favorable time to give toxin-antitoxin is between six and twelve months, then remind the parents of those facts at the proper time and immunize the child. This would save many lives now sacrificed to diphtheria. Also it would obviate the need for immunization of children of school age and would establish the only system by which the eradication of diphtheria can be assured, namely, immunization of young children by their family physician.

Dr. F. F. Wesbrook, Director of Laboratories, made the Widal test a routine procedure in Minnesota in November, 1896, and the Division of Preventable Diseases has all the reports on file now. Also it has filed by county, sanitary district and family name all reports of *typhoid* cases and deaths since January 1, 1913.

This central file of records and of epidemiological field reports sometimes enables the director to correlate widely separated cases due to a common source which is unsuspected by the patient or his physician. In tracing carriers these records are often of great value. Since the human body is the only reservoir of typhoid infection the identification of carriers is extremely important. For seven years the Division of Preventable Diseases has followed up typhoid convalescents whose occupation was such that they would become a menace if they remained carriers of typhoid bacilli. All typhoid convalescents should be supervised in this way and that may be done later. Restriction on occupation, etc., is kept up until the Widal reaction is absent and three or more sets of bowel and bladder discharges collected at considerable intervals have been negative on isolation tests for typhoid bacilli. Then restrictions are removed but the individual is always warned to be careful since the negative laboratory findings are not conclusive proof of freedom from infection for sometimes the organisms are so few or are excreted so infrequently that they were not found by the laboratory tests.

Typhoid occurs chiefly at ages that give an average expectancy of life of 20 years or more so we estimate the probable number of carriers in Minnesota as follows: Typhoid deaths 20 years, *i.e.*, 1908-1927, 2,303; cases estimated to be ten times the deaths or 23,030; the survivors then numbered 20,727 and if 3 per cent remain carriers there would be 621 in Minnesota.

Since January 1, 1913, the Division of Preventable Diseases has identified 187 carriers (exclusive of those in state institutions) and traced to them 875 cases including 62 deaths. These carriers were nearly all identified by the epidemiologist in tracing the source of infection of an outbreak and of course in every case the laboratory has isolated typhoid bacilli from the carrier's bowel or bladder discharges or both.

In 1910 there were 688 typhoid deaths or 33.1 per 100,000. In 1927 there were 28 deaths or 1.04 per 100,000. This reduction of typhoid fever has been brought about through the coöperative work of the Divisions of Sanitation and Preventable Diseases with local health officers. In 1927 the Division of Preventable Diseases made 111 epidemiological investigations of typhoid, did Widal tests for diagnosis on 5,708 blood specimens, and isolation tests on 1,797 specimens of discharges.

Public water supplies and pasteurization plants are supervised by the Division of Sanitation and safe water and milk are essential in typhoid prevention. With the epidemiologist, the bacteriologist, the sanitary engineer and the milk sanitarian doing good team work with the local health authorities the eradication of typhoid is possible.

These points have been cited in relation to a few diseases to show that the reports made by physicians are used constantly in routine public health work for the promotion of the welfare of the people of Minnesota.

Minnesota was admitted to the United States Registration Area for deaths in 1910. The

Board has confidence in the reliability of the mortality statistics for many years before 1910 but the morbidity statistics of 1910 are unreliable in all reportable diseases and in certain ones are unsatisfactory today.

To illustrate the use of mortality and morbidity statistics let us consider the five leading causes of deaths with death rates per 100,000 in Minnesota 1910-1927.

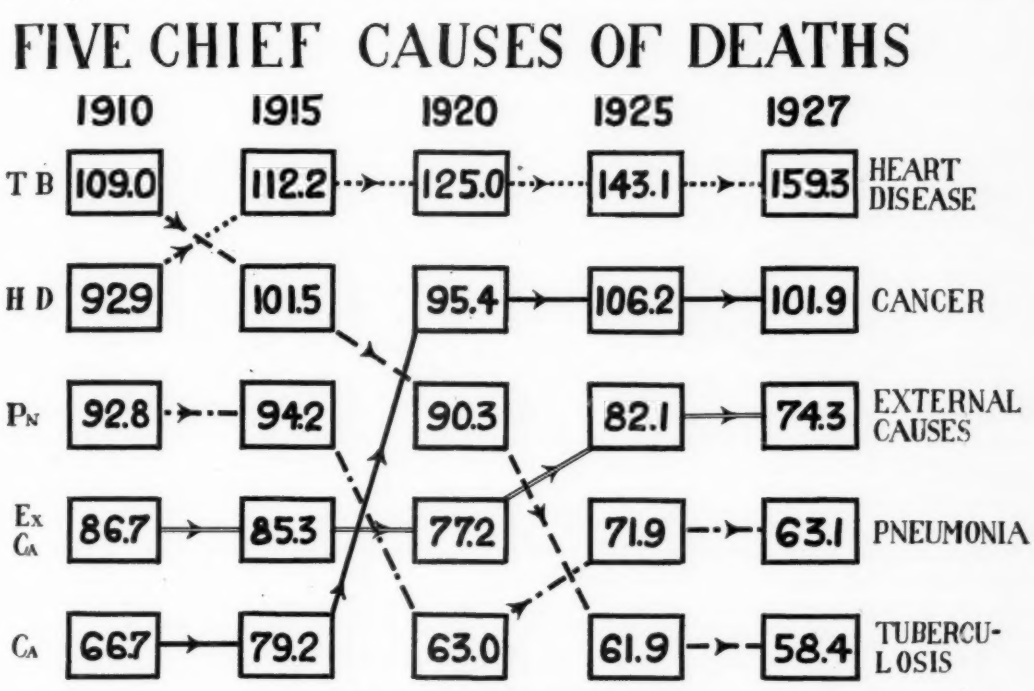

Fig. 1. Death rates per 100,000 population.

Year	Disease	Number of Deaths	Death rate Per 100,000 population
1910	Tuberculosis	2270	109.0
	Heart Disease	1934	92.9
	Pneumonia	1933	92.81
	External Causes	1806	86.72
	Cancer	1391	66.79
1915	Heart Disease	2516	112.2
	Tuberculosis	2281	101.52
	Pneumonia	2117	94.22
	External Causes	1918	85.36
	Cancer	1780	79.22
1920	Heart Disease	2985	125.05
	Cancer	2285	95.4
	Tuberculosis	2157	90.35
	External Causes	1843	77.21
	Pneumonia	1506	63.09
1925	Heart Disease	3671	143.19
	Cancer	2723	106.2
	External Causes	2105	82.11
	Pneumonia	1845	71.97
	Tuberculosis	1587	61.9
1927	Heart Disease	4208	159.3
	Cancer	2738	101.93
	External Causes	1997	74.34
	Pneumonia	1696	63.14
	Tuberculosis	1569	58.41

"Heart Disease" in 1914 displaced Tuberculosis as the leading cause of death with a rate of 113.9 against Tuberculosis with 107.86 and has maintained first place since then.

Should the Board require reports of acute rheumatic fever because of its relation to heart disease and its probable communicability? Should special study be made to determine what causative factors are susceptible to control measures?

Syphilis the pathologists tell us is responsible for from 8 to 10 per cent of the deaths from heart disease although you guardian angels of the reputation of the decedents seldom enter it on death certificates. Surveys of institutions show that about 15 per cent of the inmates who are public charges are victims of syphilis. Estimates vary from 7 to 30 per cent of still-births due to syphilis but as report is not required in Minnesota for a child that has not advanced to the fifth month of utero-gestation the still-birth re-

ports do not cover the effect of syphilis in the earlier months of pregnancy.

In 1927 there were 1,516 still-birth reports received—93.35 per cent from physicians, 1.95 per cent from midwives and 4.7 per cent from other informants. Of the *total births* nearly 3 per cent were still-births.

Venereal disease case reports by number or by name have been required by State Board regulation since January 8, 1918. In 1925 the social service handled 10,741 cases. In 1927 owing to reduced funds only 6,863 cases were handled. January to June (inclusive) 1928 the social service covered 3,268 cases and 2,247 case reports were received for syphilis, 2,377 for gonorrhea and 7 for chancroid. During these six months the laboratory examined 22,975 Wassermanns, 4,812 G. C. Smears and 566 Spinal Fluids.

The Board knows that the medical profession appreciates the free laboratory service and such social service as it has been possible to give to bring about adequate treatment of delinquent syphilitics, but is the Board justified in using public funds when the social service is very incomplete and no educational work can be done? Syphilis is curable. If the Board does its duty to the doctors and the taxpayers it should see that patients remain under treatment until cured.

"Cancer" ranks second. Should it be reported? What, if anything, should the State Board of Health do about Cancer?

The Massachusetts Health Department conducts a 90 bed cancer hospital with four specialists as consultants and eight on the visiting staff; also has six cancer clinics and is organizing five others through local medical committees. A campaign of education through newspapers, meetings, exhibits and studies in connection with the social service of the Massachusetts General Hospital, the Boston Dispensary, and a house-to-house canvass in certain cities has been conducted. Nearly two-thirds of 1,360 patients in the first year came to the clinics as a result of newspaper publicity. The study of higher prevalence of cancer among those with foreign born parents as compared with those of native born parents has been published

"External Causes" ranks third. Suicides and homicides are included. Preventable accidents, especially automobile casualties, which are second only to traumatism by falls, still increase in number. Recently a Minnesota Safety Council was organized and the State Board will aid its work but this field cannot be covered until a Division of Industrial Hygiene is established in the State Health Department, the Industrial Commission or as an independent agency. No agency now has medical experts or laboratory facilities for Industrial Hygiene work. Only fatal accidents and those in which industrial compensation is sought are regularly reported.

"Pneumonia" ranks fourth. State Board regulations require reporting of primary cases and of pneumonia following influenza and measles but practically no reports are received except through death certificates. Certain measures have been carried out with considerable success in large cities but the State Board does not think that such measures can be applied throughout Minnesota and therefore has made regulations for control of pneumonia.

"Tuberculosis" ranks fifth. Dr. Charles N. Hewitt, the first secretary of the Board, began sputum examinations in 1891. Later because physicians did not report names of cases sputum examinations were discontinued. In 1906 the Board required case reports by regulation and resumed sputum examinations. In 1910 only 682 case reports were received although 2,270 deaths from tuberculosis occurred. In 1913 the legislature passed a special law requiring the reporting of tuberculosis and for the first time more case than death reports were received, *i.e.*, 2,518 cases, 2,357 deaths. During the past ten years 1918-1927 more than one-third (6,565) of 18,800 fatal cases were reported only by death certificate.* The Division of Preventable Diseases has kept special files for living cases and for deaths since January 1, 1913. On December 31, 1927, the Division had records for 36,665 presumably living cases of tuberculosis. Each year all the deaths and cases reported are listed alphabetically by family name for each of the 87 counties. These lists naturally contain names of some persons who have died of other causes and tuberculosis was not mentioned on the death-certificate but they are very useful for county surveys and routine follow-up since they cover a period of fifteen years. Some day sufficient trained personnel may be provided for proper follow-up of tuberculosis cases but at present there seems no prospect that full time county or district health departments will be organized.

*1927—542 fatal cases had not been previously reported.

Where they exist, tuberculosis work forms an important part of the public health program.

St. Louis is the only county with a full time health department. Dr. H. G. Lampson organized and conducted this department until his death a year ago, when he was succeeded by Dr. G. J. Ferreira, who, like Dr. Lampson, has special training and unusual skill in tuberculosis diagnosis. The field work in St. Louis county was planned by Dr. A. T. Laird of Nopeming, Dr. Robinson Bosworth of the State Advisory Commission, Dr. Lampson and the State Board of Health.

In 1927 the Division of Preventable Diseases received 3,819 case reports and 1,569 death reports which are checked against previous case reports. The laboratory made 706 animal tests for diagnosis and 8,208 sputum examinations. Twenty-three epidemiological investigations of tuberculosis were made, but it is impossible to carry on studies of tuberculosis problems which Dr. O. McDaniel, Director, Division of Preventable Diseases and Dr. W. P. Greene, Senior Epidemiologist, have in mind when there are but two epidemiologists for all work in all diseases. Special studies made in previous years for specific purposes were very valuable.

Should the Board ask for funds to carry out a state-wide program similar to the Ten Year Juvenile Tuberculosis Programs of Massachusetts?

Physicians assume a great responsibility and render a public service in making reports of deaths and sickness, for the State Board of Health must depend largely upon these reports to guide its public health policies.

DRUG ADDICTION

Many wild "estimates" have been made in recent years of the numbers of "drug addicts" in the United States. It is hard to understand how—and harder to understand why—some of these "estimates" were made. When, after all the guesses and propaganda, we can find figures that are based on facts, even though they are small, we are really pleased.

The Marine Hospital, operated by the U. S. Public Health Service, discharged 98,714 patients in the years 1925, 1926 and 1927. Of this large number, fifty-five were classified as "Cases of Drug Addiction." In 1925, there were thirty, in 1926, seventeen, and in 1927, only eight. The total number of patients was greater in 1926 than in 1925, and greater in 1927 than in 1926, but the number of cases of addiction went down 50 per cent in 1926 and again in 1927.

These figures are from a report of the U. S. Public Health Service. They are small but significant, because the Marine Hospitals probably get their full share of "addicts."—A. M. A. Bulletin.

DEATHS FROM CONTAMINATED TOXIN-ANTITOXIN

At Bundaburg, Australia, last January, twelve of twenty-one children inoculated with diphtheria toxin-antitoxin at one time died within the next few days. An extensive investigation was made into the causes of the fatalities. The mixture used was issued in rubber-capped bottles, but without the addition of an antiseptic, in order to avoid possible risk from freezing. Each bottle was to be used at one time, but this was not done at first, and fluid was withdrawn from one bottle several times in the course of a week. The investigation brought out that the symptoms and the postmortem and bacteriologic observations were all suggestive of an overwhelming infection with staphylococci. Evidently the vial was contaminated during the previous injections, and in the absence of an antiseptic the organisms multiplied in the fluid. (Jour. A. M. A., November 17, 1928, p. 1553.)

FRACTURE OF THE ANKLE JOINT*

O. W. Parker, M.D., F.A.C.S.
Ely, Minnesota

FRACTURES are of great antiquity in the practice of medicine and surgery and, although the medical man has had to deal with them since the earliest time or, as Cotton says, since the Nordic first wore brogans, still, in spite of all this, we cannot say that the last word has been said.

In late years an interest in fractures has been stimulated by compensation laws, by an increase in traumatic surgery, by the greater demand that has been made on the surgeon for good results by the compensation boards, insurance companies, employing companies, the injured themselves, and by the increasing knowledge that has come from the use of *x*-rays in the study and treatment of fractures.

There is no doubt that fractures, from the standpoint of malpractice suits, constitute one of the most dangerous fields in the practice of medicine. They also present some of the most difficult problems in practice. Dr. John B. Murphy at one time said, while he was operating on a fractured surgical neck of the humerus, which was also dislocated, that he would rather do 100 operations for appendicitis than one of these cases, so far as the hard work and responsibility were concerned.

A study of the history of fractures of the ankle joint presents a fascinating story and reveals the great names in medicine of Pott, Dupuytren, Sir Astley Cooper, Maisonneuve, and, in more modern times, Stimson, Speed, Ashhurst, Scudder, Cotton, Platt, and many others who have studied these fractures and performed many experiments and added very materially to the sum total of knowledge of the lesions in these ankle joint fractures. Injuries and fractures about the ankle joint must have been problems in practice presented frequently to both the ancients and surgeons of the middle ages. It is said, however, that there is not much to be found in the writings of Hippocrates or Ambrose Pare, or other great masters of that period regarding their fractures. Not until Petit, 1674-1750, and Percival Pott, 1713-1788, and Pouteau, 1725-1775, and later Dupuytren and Sir Astley Cooper, about 1822, and still later, Maisonneuve, about 1840 (all names of men who helped splendidly in the evolution of the surgery of fractures)—not until these men began to teach that these injuries, which had heretofore always been classed as dislocations of the ankle joint, were always accompanied by fracture of one or both bones of the leg as well as dislocation, was it really known what the true lesions in these injuries were.

English and American surgeons usually speak of ankle fractures as Pott's fractures. As there are many types of ankle fractures it is often confusing to know just what is meant by a Pott's fracture. Ashhurst says Pott described a fracture which does not exist. Others, in the literature, including Colvin and Speed, say that Pott's fracture, in the strict sense, is a rare fracture. In Pott's classical illustration he speaks of an injury which consisted in a transverse fracture of the fibula about two and one-half inches above the malleolar tip combined with a rupture of the internal lateral ligament with marked outward displacement of the foot. One gathers from the literature that the general understanding among medical men is that a Pott's fracture consists of the following lesions, depending upon the degree of the fracturing force:

1. Fracture of the fibula within two and one-half inches of the tip of the malleolus due to eversion of the foot.

2. If the fracturing force continues, a laceration of the internal lateral ligament or fracture of the internal malleolus due to traction on the internal lateral ligament.

3. If the fracturing force still continues, a laceration of the interosseous and tibio-fibular ligaments is produced. This is the most important factor in the causation of untoward results in treatment.

4. The fracturing force continuing still further, producing dislocation outward and backward of the foot en masse.

*Presented before the Minnesota Academy of Medicine, Oct. 10, 1928.

5. An occasional dislocation forward of the tibia of the astragalus.

Murphy emphasized, in his clinics, the above definition of a Pott's fracture, always stating to his students that a Pott's fracture was an eversion fracture. Whether we accept Ashhurst's statement that Pott described a fracture that does not exist, or whether we believe that Pott's fracture should be limited to the rare fracture he is said to have described, it seems that we should not fail to give Pott great credit and that it is fair to assume that, in spite of the strict interpretation of his writings, he was really speaking of the great group of ankle fractures caused by external rotation or eversion and abduction which constituted, in Ashhurst's series of 300 cases, 82 per cent of all ankle fractures. We should remember that Pott did not have the *x*-ray, which has told us so much regarding fractures. It is quite likely that no one today could accurately describe a fracture of which little had been known heretofore without the aid of the *x*-ray and be sure that his statements could stand the test of future knowledge.

The name of the great Percival Pott is so intimately associated in the minds of English and American surgeons with fractures of the ankle joint that it is of interest to relate the following incident taken from his biography. In 1756 an accident befell Percival Pott which made his name world famous. As he was riding in Kent Street, Southward, he was thrown from his horse and suffered a compound fracture of the leg, the bone being forced through the integuments. Conscious of the dangers attendant on fractures of this nature, and thoroughly aware how much they may be increased by rough treatment or improper position, he would not suffer himself to be moved until he had made the necessary dispositions. He sent to Westminster, then the nearest place, for two chairmen to bring their poles, and patiently lay on the wet pavement, it being the middle of January, until they arrived. In this situation he purchased a door to which he made them nail their poles. When all was ready he caused himself to be laid on it and was carried through Southward, over London Bridge to Walling Street, near St. Paul's, where he had lived for some time. At a consultation of surgeons, the case was thought so desperate as to require immediate amputation. Mr. Pott, convinced that no one could be a proper judge in his own case, submitted to their opinion and the proper instruments were actually gotten ready when Mr. Nourse, his former master and then colleague at St. Bartholomew"s Hospital, who had been prevented from coming sooner, fortunately entered the room. After examining the limb he conceived that there was a possibility of preserving it and an attempt to save it was acquiesced in and succeeded.

Fig. 1. Copy of Pott's original illustration.

The term "Pott's fracture" is still commonly applied to the particular variety of broken ankle which he sustained on this occasion. This accident secured Pott fame along another line as well, for it was during the forced leisure of his convalescence that he first turned his attention to writing and began his treatise on ruptures which, after the lapse of 165 years, may still be read with advantage and instruction. As to whether Pott actually suffered from a so-called Pott's fracture there is some dispute in the literature. Mr. Harry Platt says it is often stated that Pott obtained first hand knowledge of the fracture with which his name has become inseparably associated, as a result of a personal accident, but this is untrue, for the injury sustained by Pott was a fracture of the shaft of the tibia from which he made an excellent recovery.

Dupuytren, the brilliant French surgeon, who lived from 1777 to 1835, was the next to contribute greatly to the knowledge of ankle joint frac-

Fig. 2. Simple oblique fracture of fibula. Mechanism, external rotation. Note that the fracture is higher behind than in front. This is true of all such fractures.

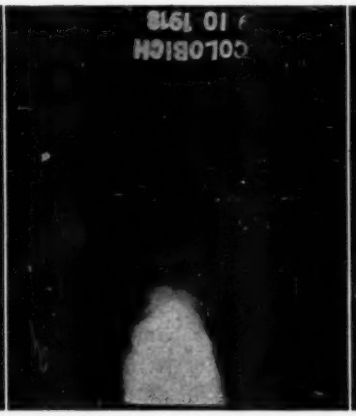

Fig. 3. Fracture external and internal malleolus, bi-malleolar. These may occur either by abduction or adduction.

Fig. 4. Fracture and displacement internal malleolus. Fracture fibula high up with triangular piece, its apex directed toward the tibia. Displacement outward of astragalus. Typical abduction fracture.

tures. The French, in speaking of Dupuytren's fracture, seem to mean the same lesion that the English do in speaking of Pott's fracture.

After Pott and Dupuytren came Sir Astley Cooper, who, in 1822, described accurately practically all lesions in fracture of the ankle. Scarcely a new one has been found with the advent of the *x*-ray. Then came Maisonneuve who, in 1840, called attention to the importance of the inferior tibio-fibular ligaments in the mechanism of ankle fractures and who first recognized the frequency of the most common and most typical fracture of the ankle, the oblique fracture of the fibula at its lower end. He found this lesion was produced by external rotation and there was usually no ligamentous injury. If the force continued further, however, the internal lateral ligament would rupture and often the internal malleolus would be pulled off. The force continuing, would rupture the inferior tibio-fibular ligaments, causing a separation of the tibia and fibula and fracture of the fibula above this joint, usually two to three inches from the tip of the internal malleolus but sometimes in the upper end and middle third. This fracture of the fibula high up was called Maisonneuve's fracture. In 1872 Tilleaux called attention to a rare result of abduction and external rotation which consisted of a supramalleolar fracture of the tibia, the fibula breaking below the tibio-fibular joint usually, but sometimes above. In 1877 Honingschmeid made 125 experiments on the cadaver to determine the mechanism of ankle joint fractures. In 1892 Stimson made a distinction between fractures produced by abduction and those by external rotation. This brings us up to the time of the first use of *x*-rays. Since then many important papers have been published by able and distinguished men on this subject. Perhaps the most outstanding monograph is that of Ashhurst, published in 1922. So much for the historical side of the subject.

As Mr. Harry Platt says, "The subject of ankle fractures is shown to be an old chapter in the history of surgery and, though a commonplace problem in surgical handicraft, is classical in its antiquity and appears strangely new as each succeeding generation comes fresh to its difficulties, often oblivious of the wealth of knowledge already bequeathed by the older writers."

Some knowledge of the anatomy of the ankle joint is essential to the proper understanding of ankle joint fractures. The ankle joint is a hinge but not absolutely so, as there is some lateral movement, but the main movement is antero-posterior. It is formed above by the tibio-fibular mortise and below by the trochlear surface of the astragalus, which fits into the mortise like a wedge. It is one-fourth wider in front than behind. The projections of the tibia and fibula beyond the level of the tibial roof form the internal and external malleoli respectively. The malleoli

Fig. 5. Oblique fracture of fibula with posterior marginal fracture of tibia, so-called Cotton's fracture.

Fig. 6. Abduction fracture with separation of tibial epiphysis and fracture fibula higher up with displacement outward in young person.

Fig. 7. Abduction fracture of fibula. Internal malleolus represented by supra-condylar fracture of tibia instead of epiphyseal separation in a young person, as in Figure 6.

form the sides of the mortise. There is a projection on the posterior side of the tibia sometimes called the posterior malleolus. There is a groove on the external lower surface of the tibia formed by the anterior and posterior tubercles into which the fibula fits very snugly. At this point the anterior and posterior inferior tibio-fibular ligaments and felt-like interosseous membrane bind the two bones together most securely. There is a very slight range of motion between the tibia and fibula at this point. The malleoli serve to keep the foot well placed under the leg bones. The astragalus acts as a ball bearing joint and has no muscles attached to it. The ligaments of the ankle joint holding the foot attached to the leg bones are the anterior, posterior, internal lateral, and external lateral ligaments. The lateral ligaments are developed more strongly and hold the joint nearly to a true hinge, permitting only a little lateral movement, the principal movement being antero-posterior. The internal lateral ligament is fan-shaped, passing from the internal malleolus anteriorly to the scaphoid and the os calcis, and posteriorly to the median tubercle on the posterior surface of the astragalus. The external lateral ligament has three distinct bands passing from the external malleolus, one going forward to the lateral border of the neck of the astragalus, the middle passing down to the os calcis, and the posterior passing to the lateral tubercle on the posterior surface of the astragalus. The posterior band is a very important factor in the mechanism of ankle fractures. It is so strong that it seldom ruptures, and the fibula and astragalus are seldom, if ever, separated in ankle fractures; thus, if the fibula fractures, the fibular fragment and astragalus are carried along together in any displacement. In backward displacement of the foot, the fibula and tibia must either be separated or the astragalus and fibula must be separated. As it is claimed the latter event does not occur in ankle fractures, therefore, in practically all posterior dislocations, as well as lateral, there must be a separation of the tibia and fibula, which means a rupture of the tibio-fibular ligaments. Remembering that the astragalus and fibula do not separate because of this strong attachment, serves as a key to the understanding of ankle fractures. The ankle joint has an approximate movement of about 80 degrees, of which 20 degrees are dorsiflexion and 60 degrees extension, or plantar flexion.

Having thus briefly considered the anatomy and physiology of the ankle joint we will now consider the subject of classification of ankle joint fractures. Fracture of the ankle joint includes two groups. The first group includes fractures of the leg bones at the lower end of the tibia and fibula. The second group consists of fractures of the astragalus, which are relatively rare and will not be considered in this discussion. There are several classifications of ankle joint fractures. First, the historical, in which the name of some great surgeon is used, as Pott, Dupuytren, etc. This classification is not entirely satisfactory and doubtless leads to confusion. It is, however, a fine sentiment which

Fig. 8. Oblique fracture of fibula, lower fragment displaced with astragalus. Posterior and outward dislocation small posterior marginal fragment of tibia.

Fig. 9. Fracture of fibula, high. Fracture internal malleolus, comminuted. Fracture anterior tubercle of tibia. Comminuted fracture tibia above, compounded; outward displacement.

Fig. 10. Fracture of fibula. Fracture internal malleolus represented by whole lower end of tibia, displacement outward en masse.

prompts us to use the names of these great surgeons in connection with these fractures and it will doubtless be continued.

The second classification, according to mechanism, is very interesting as a study and doubtless is quite satisfactory. It is difficult, however, to classify every fracture according to mechanism, as one cannot always get a clear history as to just how the accident happened, and, while the *x*-ray picture will usually show plainly what mechanism has produced the lesion, there will occur pictures in which there will be doubt and the classification will vary according to the interpretation of the individuals examining the plates. As a basis for treatment, classification by mechanism should be valuable. In considering mechanism, we find fractures of the ankle are produced by both direct and indirect violence. Since direct violence constitutes such a small per cent (only 1 per cent according to Ashhurst), classification of ankle joint fractures according to mechanism is based almost entirely on the forms of indirect force or violence to which the ankle is subjected, acting through the astragalus in such a way as to produce a breaking strain.

There are three great types of indirect force constituting the cause of 90 to 95 per cent of ankle fractures. These three forces are: (1) external rotation; (2) abduction or eversion; (3) adduction or inversion; and to these, (4) an upward compression thrust on the ankle mortise.

External Rotation.—Maisonneuve was the first to call attention to external rotation. In this movement the foot is turned or rotated outward on the ankle with the leg bones as a vertical axis, and the strain, which is a torsion or twisting, is felt by the fibula and a spiral or oblique fracture is produced. The fracture is always higher on the posterior surface of the fibula than on the anterior. The obliquity varies and the lower end usually enters the external malleolus. In practically all these fractures the tibio-fibular ligaments are not ruptured and there is no separation of the tibia and fibula. If the violence continues, the internal lateral ligaments may be torn or the internal malleolus pulled off. In some cases the avulsing force is so great as to fracture the whole lower end of the tibia, or cause epiphyseal separation in children.

Abduction.—The second force to be considered, or the next most frequent cause of fracture of the ankle, is that of abduction. In the abduction force the astragalus tends to rotate outward in the mortise and exerts a bending strain on the fibula and great torsion on the internal lateral ligament. It is considered that this is certainly a different mechanism from external rotation because whereas in external rotation the first, and often only, lesion is an oblique fracture of the fibula, in straight abduction the first lesion is either a fracture of the internal malleolus or a rupture of the internal lateral ligament. This has been proven in experiments by Honigschmeid and others. The force continuing, a

Fig. 11. Fracture of fibula, mixed oblique. Fracture internal malleolus, dislocation of astragalus and foot en masse outward and backward. Lower fragment of fibula carried backward with astragalus. Posterior marginal fragment of tibia carried backward.

Fig. 12. Fracture internal malleolus. Fracture of fibula just above joint, and high up. An unusual fracture occurring only once in our series. Quite similar to the so-called Maisonneuve's fracture.

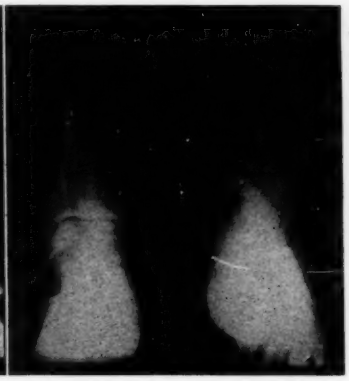

Fig. 13. Fracture of fibula above joint. Fracture external portion of articular surface of tibia. Unusual fracture occurring only once in our series.

crushing fracture of the external malleolus below the tibio-fibular ligament is produced—the bi-malleolar fracture by abduction. It is interesting to note the influence of the tibio-fibular ligaments in fracture by abduction. If these ligaments do not rupture, the fracture of the fibula is below the tibio-fibular joint, but if the ligaments tear, thereby allowing separation of the tibia and fibula, a fracture of the bending type occurs, usually in its weakest point, the surgical neck above the lower tibio-fibular joint. The *x*-ray pictures show the separation of the tibia and fibula and a flexion or inward bend of the fibula. The fracture of the fibula, being of the bending type, follows the law of Messerer; thus it breaks rarely transversely, a little more frequently slightly obliquely, and nearly always is comminuted in a typical manner, as illustrated by Messerer, with a wedge of bone from the concavity of the bend, the apex being directed toward the tibia. In fracture by abduction, as in external rotation, a separation of the whole lower end of the tibia may result, but the fibula fracture is of the bending type and not the torsion or spiral type. In some fractures it may be very difficult to say whether they are produced by external rotation or abduction. A combination of both forces is probably present.

Adduction or Inversion.—The third most prominent mechanism is that of adduction or inversion. The first lesion to occur is fracture of the external malleolus, usually at or below the level of the tibial roof, followed, if the force is continued, by a compression fracture of the internal malleolus from the inward thrust, both malleoli being fractured. It is called bi-malleolar fracture by adduction or inversion in contradistinction to bi-malleolar fracture produced by abduction. These fractures are also called "reverse Pott's." There may also occur a splitting fracture of the tibial shaft due to the weight of the body, forcing the tibia heavily on the displaced astragalus.

Upward Compression.—While the great majority of fractures of the ankle joint are caused by these three forces, external rotation, abduction and adduction, there is still another force to be considered, that of compression, or the effect of the body weight thrown on the injured limb at the time of injury, usually from falls from a height. Its general effect is to increase the separation and displacement from the previous mentioned forces. It also produces the so-called "Cotton's fracture" or posterior marginal fracture of the tibia. Cotton called attention to this fracture several years ago, although it seems to have been known by several of the older writers, including Cooper and Dupuytren. It sometimes occurs as an isolated lesion but usually is associated with fracture of the fibula by external rotation or abduction with gross displacement of the astragalus. It consists of a triangular fragment extending down into the ankle joint in the neighborhood of the tibio-fibular joint. The fragment usually remains attached to the external malleolus by the posterior inferior

Fig. 14. Comminuted fracture of fibula above joint, bending type. Spiral fracture tibia above joint, compounded; operation.

Fig. 15. Same case as in Figure 14 after replacement by internal splints. Lane plate and external splint, plaster cast.

Fig. 16. Internal sole of shoe raised and Jones' external iron with T-strap around ankle for support. Abduction or external rotation fracture.

tibio-fibular ligament and is often displaced backward with the external malleolus and astragalus.

It is interesting to note the percentage of incidence in these forms of indirect violence. Probably the most careful and authoritative study has been made by Ashhurst. He studied 300 cases and found that external rotation produced 61, abduction 21, and adduction 13 per cent. These forces caused 95 per cent of all ankle joint fractures. Platt, in a study of 116 cases, found about the same relative incidence. In connection with our fracture work at the Shipman Hospital, I have carefully re-examined the *x*-ray pictures of the last 688 fractures, taking them as they came. These fractures occurred largely in the iron mining industry. There were 115 ankle joint fractures in this series, not including fractures of the astragalus, or about 16 per cent. Kellogg Speed, in reviewing 1,316 fractures at Cook County Hospital, found 208 ankle joint fractures, or about 15 per cent. It will thus be seen that ankle joint fractures are rather frequent and of great importance economically because most of them occur in laboring men at the most active period of their lives.

In classifying these fractures as carefully as possible, following Ashhurst's tables, I found 42 per cent due to external rotation, 35 per cent due to abduction, and 14 per cent adduction, or a total of 91 per cent caused by these three forces.

Following is the grouping of our 115 cases following Ashhurst's table of classification by mechanism, as nearly as I could:

A—Fractures by External Rotation

1—First Degree:
Lower end fibula only (mixed oblique) 39

2—Second Degree:
Same, plus rupture of internal lateral ligament or fracture of internal malleolus ("low Dupuytren") 9
(a) Rupture, Internal Ligament 4
(b) Fracture, Internal Malleolus 5

3—Third Degree:
Same, plus fracture of whole lower end of tibia, representing the internal malleolus 0

Total Fractures by External Rotation 48

B—Fractures of Abduction (Fibular Flexion)

1—First Degree:
Internal malleolus only 19

2—Second Degree:
Same, plus fracture of fibula (transverse, above or below tibio-fibular joint) 19
(a) Complicated by posterior marginal fragment of tibia 5

3—Third Degree:
Internal malleolus represented by whole lower end of tibia 3

Total Fractures by Abduction 41

C—Fractures by Adduction (Tibial Flexion)

1—First Degree:
External malleolus only, transverse at or below level of tibial plafond 8

2—Second Degree:
Same, plus
a—Internal malleolus below level of

tibial plafond ("bi-malleolar fracture") 8
b—Median surface of tibia up and in from joint surface..... 0
3—Third Degree:
Same, plus whole lower end of tibia ("supra-malleolar fracture by adduction") 0
Total fractures by adduction..... 16
D—Fractures by Compression in Long Axis of Leg
1—Isolated marginal fractures..... 0
2—Comminution of tibial plafond and fractured fibula..... 1
3—T- or Y-fractures ("V-fractures of Gosselin") 0
Total Fractures by Compression..... 1
E—Fractures by Direct Violence (supra-malleolar types)..... 6 6
F—Fractured Fibula alone, Direct Violence..... 3 3
115

Finally, in the matter of classification, perhaps the simplest and best of all classifications is that based on anatomical groupings. Ashhurst, while seeming to favor the classification according to the mechanism, also groups his 300 cases under an anatomic classification.

Following are our 115 cases grouped according to Ashhurst's anatomic table:

A—Fibula, Below Inferior Tibio-fibular Joint
1—Alone (slight or no displacement, often subperiosteal) 19
2—Same, plus internal malleolus below tibial plafond (includes bi-malleolar fractures by adduction and by abduction)..... 9
3—Same, plus split of tibia up and in..... 1
Total Fractures, Fibula Below Inferior Tibio-fibular Joint 29
B—Fibula, Obliquely Through Inferior Tibio-fibular Joint
1—Alone (slight or no displacement, often subperiosteal) 28
2—Same, plus rupture of internal lateral ligament 0
3—Same, plus fracture of internal malleolus 6
4—Same, plus fracture os calcis..... 1
Total Fractures, Fibula Obliquely Through Inferior Tibio-fibular Joint..... 35
C—Fibula, Above Inferior Tibio-fibular Joint
1—Alone (slight or no displacement, often subperiosteal) 3
2—Same, plus rupture of internal lateral ligament and diastasis..... 4
3—Same, plus fracture of internal malleolus and diastasis 18
4—Same, plus fracture outer aspect tibial plafond 1
Total Fractures, Fibula Above Inferior Tibio-fibular Joint 26
D—Tibia, Involving Ankle Joint
1—Internal malleolus alone (slight or no displacement, often subperiosteal)..... 19
2—Isolated marginal fractures..... 0
3—Comminuted, T- and Y-fractures..... 0
Total Fractures, Tibia Involving Ankle Joint 19
E—Supra-malleolar Fractures, Not Involving Ankle Joint Directly (Probably Direct Violence) 6 6
115

Platt, who has recently written a most excellent and authoritative paper on ankle fractures, favors the anatomical classification as being the simplest, the most understandable, and best one for keeping records. Dickson, who read a paper on ankle fractures at the last meeing of the American Medical Association, uses and prefers an anatomical classification. Following is his classification which he says is essentially Platt's:

A—Fractures of the Malleoli
1—Isolated
a—Fibula
b—Internal malleolus
2—Combined
a—Low bi-malleolar without displacement of astragalus
b—Bi-malleolar with displacement of the astragalus (Pott's-Dupuytren fractures)
B—Fractures of the Weight Bearing Surfaces of the Tibia
1—Isolated
a—Posterior marginal fractures
b—Anterior marginal fractures
2—Combined
a—Anterior or posterior marginal fractures associated with fractures of the malleoli

Diagnosis and Clinical Consideration.—In all injuries about the ankle joint in which there is a history of forcible movement of the foot, a fracture should be suspected. Usually the injury is so severe that the patient cannot walk. The foot is usually held in plantar flexion and everted in varying degrees, the internal malleolus being prominent. In the severe cases there are abnormal mobility, especially in the lateral direction of the joint, points of tenderness around the ankle and often great swelling. It hardly seems necessary to detail all the clinical signs in the diagnosis of a fracture with which all physicians are quite familiar. Suffice to say that in all ankle injuries a full radiographic examination should be made, especially when there is an indirect forced type of movement such as external rotation, abduction, or adduction. While the more serious types of ankle joint fractures are plainly evident without *x*-ray, there are many ankle

joint fractures in which it is very difficult to determine whether or not a fracture is present. The *x*-ray picture will always clear up the diagnosis besides showing plainly just what lesions have been produced. Both antero-posterior and lateral *x*-rays should be taken, as the simple oblique fracture of the fibula may not show with an antero-posterior view but will always show in a lateral, and a fracture of an internal malleolus may not show in the lateral but will always show in the antero-posterior view. The *x*-ray also shows the varying degrees of displacement of the astragalus in its relation to the tibia. Sometimes these displacements are very slight but they should be considered in the treatment, as perfect reduction of the astragalus in relation to the tibia is very necessary for good recovery of function.

The treatment of ankle fractures naturally resolves itself into two groups, treatment of the recent fracture and treatment of the old fracture in which a poor result has been obtained. Each one of these old fractures constitutes a problem in itself and this group will not be considered in this discussion.

Dupuytren said, "Under the most favorable circumstances they, that is, fractures of the lower end of the fibula or of the ankle, almost always leave deformity and lameness which renders progression more or less painful and difficult," but he seems to have treated his own cases very well for he reports 202 out of 207 ankle joint fractures as cured, and of these in two only was there deformity and in one only loss of mobility. He had five deaths in these series, but as these were compound fractures occurring before the time of Lister, we can easily account for the deaths from sepsis. It is very evident that Dupuytren taught and perfected efficient methods of treatment. Murphy once said in his Clinics, "Failure to secure a good result from treatment occurs more commonly in connection with Pott's fracture than with any other type except a Colles' —Colles' fractures more frequently result in a failure to restore normal conformation but one not nearly so detrimental to the comfort and service of the patient as in the case with a Pott's fracture with poor conformation." Speed says these fractures do result in some permanent impairment of function even when treated by the best of methods devised to date. Dent, speaking of these fractures, said that most of the London police who sustained a Pott's or Dupuytren's fracture were unable to resume their duties on the police force. A deformed painful ankle and obstinate flat foot are too often the bad results of these fractures.

These words, from such masters, should stimulate us to do our very best in the treatment of these fractures in order to prevent the bad results of which they speak and with which they must have frequently come in contact and, as these fractures constitute about one-sixth of all fractures and occur mostly in laboring men of the industries at the most active period of their lives, poor results bring a great economic loss.

The question of conservative or operative treatment comes up for consideration in fractures of the ankle, as it does in the treatment of all other fractures. The general consensus of opinion gathered from the literature seems to favor conservative treatment in practically all cases except those specially selected cases where satisfactory apposition and maintenance of the apposition cannot be achieved by the usual splints or plaster. Such specially selected cases should, no doubt, be treated by operation. In this connection, however, it is well to note the remarks of Ollerenshaw, who said that, while good reduction of the deformity is essential, it is not necessary to secure the most absolute precision in order to get complete return of function. The best results seem to be obtained by the conservative treatment, reserving special cases for operation. Even in England, the home of the teaching of the Sir Arbuthnot Lane School of operative treatment of fractures, acceptance of this teaching, so far as ankle joint fractures are concerned, has not met with ready acceptance. In this connection it is interesting to consider the following, quoted from Mr. Harry Platt:

"When I began to take an intensive interest in this subject some three years ago, stimulated particularly by Ashhurst's unique paper, my general impression was that the routine use of non-operative methods was attended by far too many disappointments. At that time I felt tolerably certain that sooner or later I should be persuaded to give a systematic trial to reduction and fixation by open operation. This attitude was chiefly determined by the fact that the majority of the patients with recent ankle joint fractures dealt with in my clinic were discharged from physiotherapeutic treatment somewhere between the eighth week and sixth month, according to the type of case. At this stage most of them were considered fit to undertake light work. In many cases the records made at the time of discharge emphasized the existence of a slight

limp, necessitating the use of a stick, and many ankle joints which showed a satisfactory anatomical result were not entirely free from discomfort, and sometimes showed limitation of mobility. But my earlier impressions have been considerably modified by the information obtained from a survey of the late results, for it has been the rule to find that steady improvement has occurred from the sixth month onwards. I have been able to trace about 90 per cent of the cases, and to estimate the type of functional result, either from a personal examination or from the answers given in a questionnaire. The most striking results are seen in the patients reviewed after a period of two years or more has elapsed from the time of the injury, the great majority of whom have been able to return to pre-accident occupations involving laborious duties; no patient in this series is prevented from working as a result of his injury.

"I am confident that in the greater proportion (if not all) of ankle joint fractures accompanied by displacement even of the most extreme degree, it is possible, by non-operative methods, to achieve perfect anatomical reposition, and insure the highest standard of functional result. Similar views have been emphasized recently by Ferry of the Strasbourg University Surgical Clinic."

In our own series we have followed the conservative treatment, reserving operation for only a selected few. So far as I know, all of these patients in this series have been able to resume their regular work and perform the same duties they did previous to the accident. It is our practice to *x*-ray immediately all injuries to the ankle, taking a lateral and antero-posterior picture, often on the same film, to determine first whether a fracture is really present and, second, to determine just what type of fracture we have to deal with, what bones are fractured, the extent of displacement, and especially the relation of the tibia and astragalus to each other at their articular surfaces, as it is very important to recognize all grades of dislocations of the astragalus from the tibia so that it may be reduced, as it is very necessary that the astragalus and tibia be in normal relationship and with good alignment for future function in weight bearing.

Having determined by clinical examination and *x*-ray pictures just what lesions we have to deal with, we almost invariably put the patient to sleep at once and reduce the fracture. We feel more and more, in our experience with fractures, that the quicker the reduction is accomplished, under anesthesia in nearly all instances, the easier will be the reduction, the less the pain and discomfort to the patient and the more satisfactory the result. We do not recall a case in which the swelling or disloction of the ankle was too great to prevent immediate interference and reduction. Immediately after reduction, it is our practice to apply a plaster cast from the toes to just below the knee, first being sure that the leg is well bandaged and padded, especially over the bony prominences and overt he head of the fibula to protect the external popliteal nerve as it winds around the neck of the fibula. In the fractures due to external rotation and abduction in which the foot turns out, the foot is put up in a strongly inverted position and dorsiflexed to a right angle to the tibia, being sure that the heel is inverted as well as the anterior part of the foot. If the fracture is bi-malleolar on a level with the tibial roof and, due to adduction, the so-called reverse Pott's, and also bi-malleolar from abduction, the foot must not be put up in a strongly inverted position, as the upper end of the lower fragment of the fibula is then apt to be pulled too far in and left under the tibia, the result being that the patient eventually comes to walk on his exernal malleolus. These fractures are rather difficult to get in proper position so that both malleoli unite perfectly. Accurate replacement of the malleoli with the foot dorsiflexed to a right angle without lateral or medial deviation, or in a very slight adduction, should be the rule. Murphy favored nailing the malleoli. Speed says in these bi-malleolar fractures at the same level the malleolus can sometimes be reduced through manipulation and a plaster cast applied, but many cases require nailing to hold both sides in position. When a malleolar fracture is complicated by rupture of the interosseous ligament and separation of the lower ends of the two bones, with a possible forcing up of the astragalus between them, nothing short of open operation to press the bones together, to return the astragalus to its proper articular position, and to nail on the two malleoli and the tibia to the fibula will preserve good function and prevent the widened painful ankle. Coton says, "The inverted Pott's or reversed Pott's or inward luxation bi-malleolar fracture is often mistaken for the real Pott's or eversion fracture, and if there were no *x*-rays and no rules for the treament of Pott's fracture, these inverted Pott's fractures would fare no worse, I fear, as the well schooled interne is apt to put them up in inversion." As before mentioned, one must, in all these ankle fractures, be careful to get the astragalus squar-

ly under the tibia in good alignment for future weigh bearing. The cast, having been applied, may be bi-valved at once or at the end of two or three weeks. We have done it both ways. It is probably safer to bi-valve it at once but we have never experienced any difficulty in those that have been left on for three weeks. We have also used the Stimson lateral and posterior plaster splints with considerable satisfaction. Scudder seems to favor these splints. Speed also favors them but has modified the Stimson splint by using one splint only, consisting of an external lateral which winds around the foot. The foot is usually retained in the inverted position or whatever position it has been put up in, in the plaster splints, or cast, for a period of six weeks, then the splints may be removed and daily hot water baths and oil massage given and active and passive movements, and the splint, at least the posterior half, reapplied. It is very important to maintain the position of the properly reduced fracture of the ankle for a sufficiently long period to secure good firm union of the fragments and, more important perhaps, to give torn tibio-fibular and interosseous and other ligaments abundant time to unite firmly and solidly, for if weight bearing is borne too soon, an otherwise perfect reduction and position and result may be destroyed by the callus giving way and the ligaments stretching, allowing the foot to be pronated and the ankle widened, thus producing a painful, deformed ankle and flattened foot, with great disability of the ankle joint. Jones said, "The crux of the matter lies not in the fracture of the fibula, but in the outward and backward dislocation of the foot. However, every surgeon, in reducing such a fracture, endeavors to invert the ankle, but comparatively few take any measures to maintain inversion of the foot after the patient begins to walk." Weight bearing should not be begun short of six weeks and a longer period is usually necessary, especially in the severe fractures. Usually it must be begun lightly and gradually increased without pain, discarding one crutch and then finally both crutches. The patient should wear a strong, well supported pair of shoes and often they should be raised on inner soles and heel to keep the foot from everting, so the patient will walk on the outside of his foot instead of on the inside. Sometimes it is necessary, in addition to this, to provide the Jones outside iron brace with inside T-strap to give proper support and keep the foot inverted. Wedging of the inner side of the shoe is an old practice used by Amrose Pare. Where there is unusual persistence of edema, radiant heat and diathermy have been used. We have had no experience with diathermy.

There is no doubt but that there is a great impetus in the profession at the present time to improve in the treatment of all classes of injuries that occur in industry and this includes all fractures. Any one who has attended a meeting of the American Medical Association and watched the keen interest and large attendance upon the fracture committee's demonstrations, cannot but be impressed with this fact. It is sincerely to be hoped that the American Medical Association will continue these fracture demonstration booths, which cannot but result in great improvement and better understanding in the handling of fractures.

A new specialist, the industrial surgeon, seems to be evolving and, as Mr. Harry Platt said, "Let us confidently hope that the century-old dictum of Dupuytren will lose its sting," so that, in speaking of ankle joint fractures, it may never be said, "Under the most favorable circumstances they almost always leave a deformity and lameness which renders progression difficult and painful."

PROS AND CONTRAS IN THE USE OF IODINE FOR THE TREATMENT OF GOITER*

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A BETTER understanding of the iodine treatment in goiter necessitates a study of what has been done in previous years. You may, therefore, permit me to refer to an article most complete in the history of iodine treatment, written by Prof. F. de Quervain of Bern, Switzerland. I shall only touch upon the salient points as brought out in his paper.

We learn that iodine was used, though unknowingly, by the Chinese over 3,000 years ago for the treatment of goiter. The Greeks in Hippocrates time made use of the ashes of the sea sponge for goiter. The same we know of the school of Salerno, 1200 A. D. They also used sea sponges and sea weeds which today we know contain iodine.

Iodine as a chemical element was discovered in 1812 by Courtois of Dijon. It was Coindet, a physician of Geneva, in 1920, who then used iodine and introduced it as a remedy for goiter.

In the year 1849 Prevost brought out the thought that the lack of iodine in drinking water possibly was an etiological factor in the genesis of goiter. This thought led the French chemist Chatin to examine various foodstuffs in different parts of the country and he found the iodine content varied considerably.

This view of Chatin, though there was a great deal of opposition, laid the foundation for a prophylatic treatment. France then established in three different provinces iodine treatment for goiter. The school children received one centigram (0.01) potassium iodide daily in tablet or in liquid form.

There then originated the idea proposed by Boussingault of adding iodine to the kitchen salt. He suggested 1-5 decigrams of potassium iodide (KI) to two pounds of salt, this as a more radical treatment for well established goiter cases. In 1855 Austria followed this movement of France in goiter prophylaxis and Italy a few years later took up prophylatic treatment for cretinism.

Already at that time unfavorable reports of iodine treatment were heard. Rilliet in 1860 came out with a paper entitled "Iodism Constitutionel" in the Academy of Medicine, Paris. The war on iodine was then on. Its use was practically discontinued due to a weighty paper by Kocher on "Iodbasedow" read before the German Congress of Surgeons.

"Iodbasedow," as he determined it, is a toxic condition. Such a patient looks emaciated, has tremor combined with nervousness, is excited and anxious. This "Iodbasedow" is clinically characterized by a rapid decrease of the goitrous tumor itself. Such rapid decrease of goiter has been explained by men like Virchow as an absorption of the thyroid substance.

Many physiological facts have by now come out about the thyroid gland. Baumann in 1895 made the epoch-making discovery that every normal thyroid gland contains iodine. It is rather surprising, therefore, that the iodine treatment which had been used empirically for thousands of years should have been disregarded, even after Kendall in 1914 had isolated in crystalline form this hormone containing iodine which he called "thyroxin."

We know today that the content of iodine in a normal human thyroid gland amounts to only 25 mgs. Marine's and Lenhart's experiments on dogs showed that 1 mg. of iodine prevented goiter in these animals, though they were living under conditions which otherwise produced thyroid enlargement. Boothby and Sandiford found that 1 mg. of thyroxin was sufficient to exert its effect on the metabolic rate in man for as long as seventy days. All these facts bring out the importance of the use of small dosage of iodine in the treatment of goiter.

Marine, as a leader in this question, has proven that 2 grams of sodium iodide administered over a period of two weeks twice yearly was fully sufficient as a prophylatic treatment, and, of 1,182 goiters, 773 showed reduction. In Switzerland it has been found that even smaller doses, 1 or

*Read before the Staff of the Northwestern Hospital, Minneapolis, Minn., Jan. 16, 1928.

2 mgs. a week, were considered sufficient (Hunziker).

This is the basis upon which any prophylaxis must be instituted. Under what form this prophylaxis would have to be established is a matter which has to be figured out by the men who may be entrusted with this most difficult task, a goiter prophylaxis in a large country like ours.

TREATMENT

Every goiter case must have a history, physical examination, and accurate data obtained about the size of the gland and its vascularization; a laryngoscopic picture so as to be sure not to overlook paretic vocal cords (thus avoiding legal prosecution), and an accurate rating of the metabolism should be included. In this way we can group the cases. A simple classification is important.

We divide the goiters into two groups: the one (as we believe we know now) based upon iodine insufficiency; the other, the toxic adenoma and the true exophthalmic goiter.

The first group, due to iodine insufficiency, includes the simple goiter, myxedema and cretinism. Physiologically such goiter is but a compensatory increase of thyroid gland, considered today due to iodine insufficiency. In children and in adolescents we know that the body tolerates iodine considerably better than in adults. When puberty comes on, the products of the thyroid gland are more called upon. The same again we find in pregnancy. The menopause is a critical time, more susceptible to iodine toxicity.

In this first group of goiters due to iodine insufficiency we are in the habit of using "Iodostarine" (Hoffman La Roche Co., Switzerland), which comes in tablet form in one centigram doses (0.01). We prescribe these tablets to be taken from one to three times a week, according to the case. They should be given for a number of weeks under careful control.

There are cases treated with iodine where the goiter distinctly increases in size and becomes harder. These goiters today are known as "iodine goiters."

We have generally had better results following the dispensing of desiccated gland in one to three grain doses given mostly three times a day. We have seen more reduction of the goiter by this remedy than by the use of iodine. I was pleased to see that men like Marine have made the same observation. If there are no untoward effects like nervousness and increased pulse we continue the treatment of one to three grains of desiccated gland three times a day for one or more months, alternating with the mentioned amount of iodine.

The effect of iodine upon the body weight in simple goiter and in myxedema must not be confused. If there is loss of weight in simple goiter cases by giving either iodine or desiccated gland, then we must interrupt the treatment. In myxedema we are looking for decrease in weight, which means a decrease of the superfluous deposit of mucin in the body. We have had cases of myxedema that lost twenty pounds of body weight when the metabolic rate became normal.

We are unable to promise a patient with full-grown goiter a cure by medicine, especially if there are anatomical signs of degeneration within the growth like cysts, hemorrhages and calcareous deposits. Therefore, most such goiters become surgical, their operative mortality having become exceedingly low in experienced hands.

EXOPHTHALMIC GOITER

The etiology of exophthalmic goiter is not known as yet. Men like Charcot, Trousseau, and others were of the opinion that Graves' disease is not a disease of the thyroid gland primarily, but has its origin in the visceral nervous system. The hypothesis of Moebius that the thyroid section in Graves' disease is an abnormal product, toxic to the body, a theory recently taken up again by Plummer, has been opposed by Marine. He fed as much as 11 grams Graves' disease thyroid to severe cases of hyperthyroidism without any change in their clinical condition, while a decigram of the standard desiccated thyroid produced a very marked reaction. He says that "this is just the opposite of what should occur if the severe case associated with marked hyperplasias were producing a more toxic secretion and we considered this experiment as additional proof that the thyroid in Graves' disease was not different from the thyroid of similar morphological and chemical constitution of other clinical associations."

Supposing now that the diagnosis of exophthalmic goiter is made, that we have before us a typical hyperplasia with exophthalmus and all the other symptoms belonging to Graves' disease or may it be only a toxic adenoma which has

become grouped under hyperthyroidism on account of the general symptoms, tachycardia, goiter, possibly without exophthalmus. What is its treatment now and what was it formerly?

At Kocher's time, when I was his assistant, there was no specific treatment for exophthalmic goiter. The patient was hospitalized and the bed rest with some diet had always a surprisingly good effect. There was no medication. Kocher's view of iodine which I have previously brought out in describing what he termed the "Iodbasedow" excluded this drug. Still it was Baumann and later on Kocher himself who found a decreased amount of iodine in the glands of Graves' disease; rather surprising that this thought had not been followed up.

In 1920 E. Neisser published favorable, at times sudden and even miraculous results following iodine medication in small amounts in Graves' disease. He used five drops of a 5 per cent KI solution three times a day, increasing to 30 drops three times a day.

A. Loewey and H. Zondek confirmed these good results in twelve further cases and others again were unable to confirm Neisser's success.

For all those years we were struggling in the dark. Our point of aggression was the gland itself. We tried to bring down the circulation gradually so as to reduce the amount of poison given up to the body by the thyroid gland. We ligated one horn, then another horn, sometimes three and four major arteries. It is true that we had often had remarkable results, at times almost sudden improvement within twenty-four hours or within a few days. In fact we had patients who remained well for more than twenty years after both upper poles were ligated. We explained our good results following ligation by the fact that the non-absorbable suturing material (silk or linen) were used besides catgut and also because we not only tied the superior thyroid artery alone, with or without the veins, but we took in the whole tip of the upper horn. By doing so we included the posterior branch of the upper thyroid artery, a fact easily overlooked.

The good results following our ligation operations often made us decide not to do more surgery; however, as in a great percentage of these cases of hyperthyroidism the condition recurred we became convinced that we fell short with our conservation methods.

Today we have landed on safer ground. The preoperative treatment with Lugol's solution introduced by Plummer a few years ago has given us a wonderful aid. It is to his credit that the mortality of the radical treatment of exophthalmic goiter has come down to such a surprisingly low rate.

Lugol's solution is given to the hospitalized patient suffering from exophthalmic goiter in five drop doses t.i.d., increasing two or three drops daily until the patient receives ten drops three times a day or from ten to twenty drops three times a day. We consider it essential to give this drug following the meals in two to three ounces of cream. It is striking that such a drug is so well tolerated by frail, young or old, individuals.

In typical exophthalmic goiter the severe nervousness, the gastro-intestinal symptoms, the tachycardia, the erythematous condition of the skin and so on, less the exophthalmus, improve together with an increase of the body weight within five to ten days to such a degree that the patient presents a good surgical risk. The drug has to be continued on the day of the operation and following the operation in order to overcome, or anyway diminish, the post-operative storm. The operation should take place when the remission has reached its height. It is very often beneficial to go on for a month or two following the operation with smaller doses of the drug.

The metabolic rate is our laboratory control. We repeat the statement that every goiter case has to have a metabolism test at the start and in hyperthyroidism this test is repeated at a later date previous to operation. If the decrease of the metabolic rate goes hand in hand with the clinical improvement, then the prognosis for surgery is good.

This improvement is not so evident in toxic adenomata cases. Here often we find the tachycardia does not improve in spite of Lugol's and rest in bed. These are the cases where we have to think of our former years' régime, where we have to feel our way through (so to say); these are the cases where the ligation improves the condition so much that a radical excision may be tolerated.

The number of ligation operations has decreased markedly through the use of the Lugol treatment, another great advantage of this medication.

In glancing through our own material we find 170 cases where the metabolic rate has been determined. Of those, 145 were operated upon; seventy-nine belonging to the true exophthalmic class in the ages between 11 and 71; sixty-six toxic adenomatas between the years 18 and 67. In both these groups we find the disease occurring in the proportion of five women to one man. The predominant age for the exophthalmic goiter is between thirty and forty years, while most of the toxic adenomatas are within the years of forty to fifty. Without further tabulation we are unable to say how much of a percentage of improvement in the metabolic rate we had in our cases. But incidentally we will mention that in forty-eight goiter operations last year there were forty-five radical resections and three ligations without death.

Today we have no scientific explanation of the action of Lugol's solution upon Graves' disease. We will quote, though, Marine's hypothesis. He says:

"Iodine by causing a rapid accumulation of colloid in the aveolar spaces produces a pressure retention of the secretion until the cells accommodate themselves to function under the increased tension."

In reference to this I will cite a publication that appeared (Feb., 1926) in the Southern Medical Journal by Henry M. Thomas and William F. Rienhoff from Baltimore, Md. Their report is on thirty cases of Graves' disease. They excised an upper horn of such a diseased gland previous to the administration of Lugol's solution, thus demonstrating histologically a most pronounced picture of hyperplasia. Then they treated these cases with Lugol's solution. The gland was then excised and the microscopical section showed a transformation toward ordinary colloid goiter.

This same Lugol's solution not used as Plummer advocated for a preparatory treatment to surgery loses all its value after a certain time and the entire complex of symptoms of hyperthyroidism comes back. If this is not thoroughly understood the solution can be just as harmful as beneficial.

The purpose of this paper is to leave the thought that only minute doses of iodine should be used for prophylaxis and for the treatment of non-toxic goiter. Moreover massive doses of iodine as indicated by Plummer's pre-operative treatment for Graves' disease must not be used unless it be in direct conjunction with surgery.

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LENDING AID AND COMFORT TO QUACKERY

The federal officials whose business it is to prosecute the exploiters of medical fakes and frauds have for years complained that the government is much hampered in its legal assaults on quackery by the fact that physicians of standing will sell their expert testimony to the nostrum exploiters. Regardless of the nature of the evidence or opinion, the appearance of a reputable physician on the side of the quack may lead a jury to believe that the nostrums under consideration are worth while and that the claims made for them are true. Recently hearings have been held before the Federal Trade Commission in the matter of a quack "obesity cure" known as "Marmola." It is sold by one Edward D. Hayes, who at the present time does business under the trade name "Haladam Co." He has repeatedly been prosecuted for the exploitation of quack nostrums. Marmola, according to the exploiters, has essentially the following composition: Desiccated thyroid ½ grain, extract of bladderwrack (fucus vesiculosus) 1 grain, extract of phytolacca ½ grain, extract of cascara sagrada ¼ grain, phenolphthalein ¼ grain. For the government Dr. Charles A. Elliott, Solomon Strouse and Rollin T. Woodyatt testified as to the effects of the indiscriminate use of thyroid substance by the public. Not one of these three men charged the government a cent—they donated both their time and special knowledge. At a subsequent hearing Edward D. Hayes had expert witnesses to testify that Marmola was a scientific (!) preparation and that it was harmless when used according to directions. The men that testified to this effect were: Robert W. Keeton, Alonzo C. Tenney, Frank L. Stone, George W. Funck, Harold S. Hulbert, Samuel F. Haverstock. Each of these men is a member of his local medical society and, through that, has qualified as a Fellow of the American Medical Association. Here, then, is a sweet spectacle: the American Medical Association attempting to protect the public against quack remedies, while individual members lend aid and comfort to the exploiters of quack remedies. (Jour. A. M. A., November 3, 1928, p. 1377.)

THE PRESENT STATUS OF THE PROSTATIC PUNCH OPERATION*

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UROLOGISTS have appreciated for some time not only the difficulty of dragging from its bed the atrophic adherent and sclerotic tissue of an obstructive median bar but the absurdity of performing a major operation for the removal of so small an amount of tissue. To overcome this difficulty and objection many types of instruments were devised for intra-urethral use, those of Young, Caulk, and Braasch being most generally employed.

Many such instruments have not been more generally accepted, I believe, for two reasons: the lack of adequate vision during the operation, and the incidence of postoperative hemorrhage and the difficulty of controlling it. Braasch, by adding a tubular knife to his direct cystoscope, overcame the objection of inadequate vision, and with the advancement and refinement in the application of electricity Caulk overcame to a marked degree the incidence of hemorrhage by changing the cutting blade of Young's original instrument to a cautery knife.

If patent rights would permit the combining of these two instruments I believe an absolutely bloodless operation under adequate vision would be possible and sufficient tissue could be removed to insure satisfactory results. Striving for the same end, namely, adequate vision with control of bleeding, Collings and Foley by utilizing the finer refinements of electrical development together with the marked improvement in the lens system of cystoscopes have developed instruments that promise to give adequate vision and satisfactory hemostasis.

The main objections to the punch operation being removed, it is apparent that its more universal application must follow and it seems pertinent, therefore, at this time to report the results obtained with the earlier instruments in order that we may more readily appreciate the proper field of application and the limitations of the operation. Unless such limitations are appreciated unsatisfactory results may be attributed to these new instruments or the operation may be undertaken when greater experience would have contraindicated this particular form of treatment.

Because the symptoms caused by bar formation at the vesical neck are analogous to those produced by prostatic hypertrophy, many physicians attempt to treat the condition by the same method, although, as we know, the underlying pathologic changes are entirely different, one being due to hyperplastic changes and the other to atrophic.

It is, therefore, imperative to ascertain at the start which process is responsible for the symptoms. If they are due to median lobe hypertrophy and there is only slight lateral lobe enlargement, success may be expected by the use of the punch. If the median lobe is entirely removed in the presence of equal or greater hypertrophy of the lateral lobes, the removal of the median lobe will allow the lateral lobes to approximate still closer, and instead of relieving the symptoms by removing the existing obstruction a greater degree of obstruction may take place. This fact undoubtedly explains an axiom frequently heard that the punch operation is not applicable in cases of adenomatous hypertrophy.

In the series of 168 cases, the results of which I shall report, adenomatous hypertrophy was found in the removed tissues in twenty-two cases. Only one of the patients heard from failed to report benefit; fourteen reported that they were completely cured, and the other three were improved. This confirms Keyes' remark: "It is the fibrous rather than the adenomatous obstructions that will—shall we say immediately recur or immediately not be relieved." Unless all obstructing tissue is removed relief of symptoms of obstruction can hardly be expected. This is borne out by the fact that of the ten patients in this series in whom complete prostatectomy was necessary later, nine had sufficient lateral lobe enlargement to call for comment on cystoscopic examination, emphasizing that it is the position of the obstruction, not the type, that determines the success or failure of a punch operation.

*From the Section on Urology, Mayo Clinic, Rochester, Minnesota. Read before the North Central Branch of the American Urological Association, Columbus, Ohio, November 2 to 3, 1928.

The cicatricial changes due to chronic inflammation, of course, offer the greater percentage of cases applicable to the punch. Yet care must be exercised to be sure that such cicatricial changes have occurred, for it has been my experience that no greater mistake can be made than to try to relieve the symptoms of prostatitis associated with 25 or 50 c.c. of residual urine, or none, by removing a portion of the edematous and engorged sphincter. The symptoms are usually aggravated, the inflammation increased and the distress of the patient magnified, with the result that this particular form of treatment is forever in disrepute. It must not be overlooked that complete prostatectomy for the same condition is frequently of little avail.

However, when the inflammatory process has finally produced cicatricial changes that obstruct the vesical neck and considerable time has elapsed since the condition was acute then one may expect and does obtain gratifying results by the removal of the bar by some method of incision or excision. Unless there is obstruction, however, with associated residual urine, it has been my experience that relief of dysuria or frequency will not occur by the removal of cicatricial tissue around the neck of the bladder.

In a series of 952 prostatectomies performed at The Mayo Clinic during the last five years (prior to January, 1928) the punch operation was performed in 168 cases: a ratio of 1:6. Eighty-two of these 168 operations were performed with Caulk's cautery punch and eighty-six with Braasch's instrument. The latter permits perfect vision during the operation and it is possible to remove as much or as little tissue as desired and at the point desired without the fear of perforating the bladder by faulty application, for not only can the tissue to be removed be seen but its relationship to all adjacent tissue can be determined.

Hemorrhage has been controlled at the completion of operation by electrocoagulation of the bleeding points with a small electrode introduced into the catheterizing sheath of the direct cystoscope. This, I believe, is superior to complete cauterization of the operative field, as febrile reactions of three days or more, which were indicative of pyelonephritis following the eighty-two cautery excisions, occurred in thirty-seven cases or in nearly 50 per cent and lasted an average of eight days. Following the knife excision such reactions occurred in only twenty cases or in less than 25 per cent and lasted an average of four days, or half as long and half as frequently. The healing following excision by the knife punch was much more rapid, and there was less ascending infection.

The patient is not allowed to leave the table until all bleeding points have been controlled. This prevents the formation of clots in the bladder and the spasm that occurs with the effort to expel them, a factor which is probably responsible for continued bleeding in many cases.

It may be noted that the operative mortality in this series was not associated with hemorrhage. There were three deaths, one the result of a deep seated prostatic abscess following the operation with ascending infection, one from a vesical perforation when the cautery punch had been used, which does not permit of adequate vision, and one from uremia and coronary sclerosis in a poorly chosen case.

I do not mean to infer by this that bleeding was not at times a distressing complication. It occurred in seven cases of the series, usually twenty-four hours after operation. In three cases immediate electrocoagulation of the bleeding points through the direct cystoscope controlled it. In three cases there were too many clots in the bladder to permit of this procedure and cystostomy was necessary. In the other case a transfusion sufficed.

I have frequently noted skepticism among members of the profession with regard to the permanency of the results obtained from a punch operation. As I have stated, prostatectomy was performed in ten of our cases later. In carefully reviewing these failures, I found that in seven of the ten cases marked enlargement of the gland (as palpated by rectum) was present, and in those in which this was not so pronounced intraurethral bilateral hypertrophy had been noted on cystoscopy. In all but three cases the subsequent prostatectomy was performed within a few weeks of the first operation.

In only four cases of the 168 studied was subsequent prostatectomy necessary at the end of a year. Caulk has stated: "If a man remains well for six months he usually will remain well forever."

We have recently heard from ninety-nine of the patients from whom only inflammatory tissue was removed by the punch and who did not

show evidence of adenomatous hypertrophy. Fifty report themselves as cured, twenty-four as improved, and twenty-five as unimproved. In reviewing these failures of the inflammatory group, it may be noted that ten cases, as demonstrated by subsequent prostatectomy, were poorly chosen for the punch operation. The other fifteen cases represent such extreme degrees of prostatitis that it is doubtful if even complete prostatectomy would have afforded relief.

In the entire series of 168 patients 123 were heard from; 53 per cent reported complete cure, 25 per cent reported improvement, and 23 per cent were not benefited.

These observations, I believe, demonstrate how limited is the field for the punch operation and how much care must be exercised in the choice of cases. For unless all obstruction is relieved by the procedure, symptoms of obstruction will persist.

In conclusion I would like to emphasize that: (1) adenomatous hypertrophy is not a contraindication to a punch operation but when confined to the median lobe offers the best prognosis; (2) cauterization of the neck of the bladder is followed by more severe and longer febrile reactions than excision by knife; (3) sufficient tissue must be removed to relieve obstruction; (4) lateral lobe hypertrophy is a contraindication to the punch operation, and (5) fear of hemorrhage need not deter one from utilizing the punch operation.

THE ROENTGENOLOGIC DIAGNOSIS OF CARDIAC DISEASES*

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THE roentgenologic diagnosis of acquired cardiac disease is dependent upon two important premises. The first is that almost all organic disease of the heart produces hypertrophy of its muscle and dilatation of its chambers. The enlargement may be general or may be confined to one part of the heart, depending upon the type of pathology which is present. The diseased heart, then, undergoes significant changes in its size and shape.

The second premise is that the size and shape of the heart can be determined, roentgenologically, with a great deal of accuracy. The *x*-ray examination is a part of the physical examination of the patient and in this instance is a substitute for percussion. Even in the hands of the best physical diagnosticians, percussion is grossly accurate only 65 per cent of the time. It becomes particularly unreliable in two groups of cases: those which are borderline and in which the determination of a slight cardiac enlargement is of great importance; those in which there are considerable secondary changes in the lungs making percussion most difficult. Roentgen examination with proper technic can determine the transverse diameter of the heart with an error of less than 5 per cent.

Space does not permit a discussion of technical factors, which are, nevertheless, of great importance, nor of many of the methods of measurement. The simplest and most generally valuable method of measurement is illustrated in Figures 1 and 2. The thorax is measured from the inner margin of the ribs at the level of the diaphragm. The midpoint of the chest is thus found and measurements made from it to the extreme left border of the heart (Ml) and to the extreme right border (Mr). The total of these is the transverse diameter of the heart, which normally measures 35 to 50 per cent of the transverse thoracic diameter, although in some markedly hypersthenic individuals the ratio may become 55 per cent. A wide variation in the size of the heart in normal individuals occurs; the total transverse diameter may vary from 7.0 cm. to 14.5 cm. This corresponds with the post-mortem weight of normal hearts, which ranges from 200 to 450 grams. The use of the cardio-thoracic ratio helps to determine enlargements in spite of this marked variation in size.

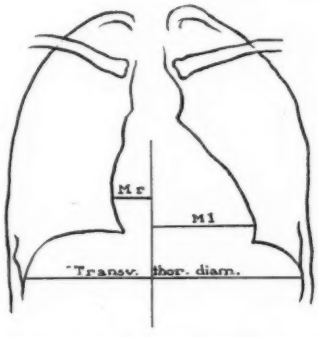

Fig. 1. Outline of normal heart in hypersthenic individual. Note the slight convexity of the left border and the prominence of the left ventricular curve.
A simple method of cardiac measurement is also illustrated.

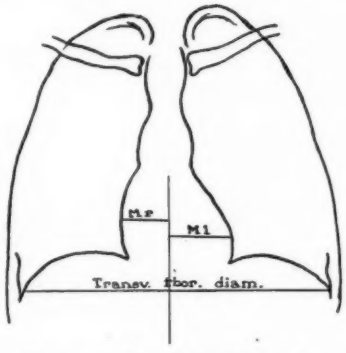

Fig. 2. Outline of normal heart in sthenic individual.
The method of measurement is again illustrated. The sum of Mr and Ml equals the total transverse diameter of the heart, which, in the normal, should be from 35 to 50 per cent of the transverse thoracic diameter.

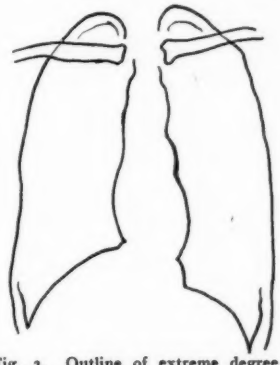

Fig. 3. Outline of extreme degree of "drop" heart in asthenic individual.

In the consideration of every case suspected of heart disease two problems present themselves. The first concerns itself with the ques-

*Presented before the Northern Minnesota Medical Association, Fergus Falls, Minn., Aug. 20, 1928.
From the Department of Roentgenology of the University of Minnesota and the University Hospital, Minneapolis, Minn.

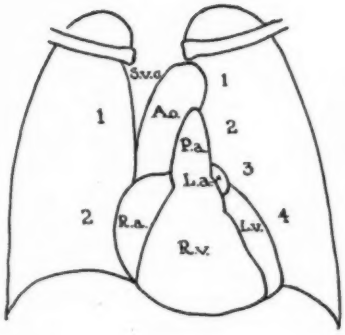

Fig. 4. Diagram of roentgenographic anatomy of the normal heart. R.a., right auricle. S.v.c., superior vena cava and vessels of neck. Ao., Aorta. P.a., pulmonary artery. L.a., left auricular appendage (only seen occasionally). L.v., left ventricle. R.v., right ventricle. Right side: 1, curve of ascending aorta. 2, curve of right auricle. Left side: 1, curve of arch of aorta. 2, curve of conus pulmonalis. 3, curve of left auricular appendage (only seen occasionally). 4, curve of left ventricle.

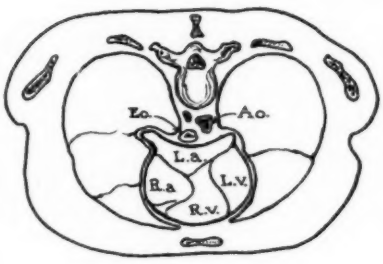

Fig. 5. Diagram of cross section through thorax showing antero-posterior position of chambers of heart and relationship of esophagus to heart. Note that the left auricle is posterior and in close relationship to the esophagus. Eo., esophagus. Ao., descending aorta. L.a., left auricle. R.a., right auricle. R.v., right ventricle. L.v., left ventricle.

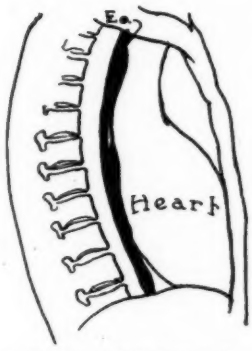

Fig. 6. Outline of right lateral view of barium-filled esophagus (Eo). The close relationship of the esophagus to the posterior wall of the heart and the clear space between it and the spine are well shown.

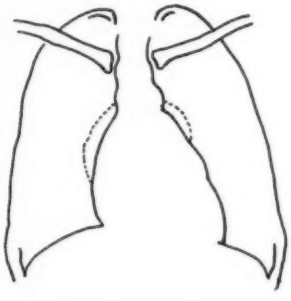

Fig. 7. Outline of heart in mitral stenosis of moderate degree. Note the moderate increase in diameter, the convexity of the middle portion of the left border, and the dilated pulmonic vessels (broken line).

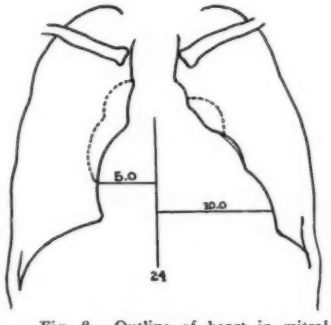

Fig. 8. Outline of heart in mitral stenosis and regurgitation of marked degree. Note the increase in cardiothoracic ratio, the marked convexity of the left border, the bulging of the conus pulmonalis, and the dilated pulmonic vessels (broken line).

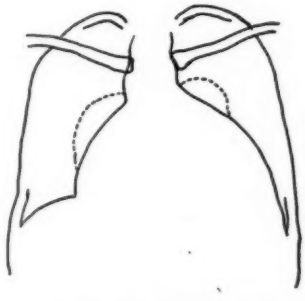

Fig. 9. Outline of heart in mitral disease of extreme degree. Note the massive enlargement of the heart, both to the right and left, the extreme convexity of the left border and the dilatation of the pulmonic vessels (broken line).

tion as to whether or not there is organic disease of the heart present. Frequently this can be best answered by the determination of the size of the heart, as organic disease usually causes appreciable enlargement. As pointed out above, this determination can best be made by the roentgenologic method because of its accuracy.

The second problem concerns itself with the type of cardiac or vascular pathology which is present. This can frequently be best answered by the determination of the shape of the heart by the roentgenologic method. The normal heart varies greatly in shape as well as in size. The typical appearance of the heart in the average or asthenic individual is shown in Fig 1. It has a slight concavity in the middle of its left border. In the hypersthenic individual this concavity tends to be somewhat accentuated and the left side of the heart is more prominent (Fig. 2). In the asthenic individual the heart appears long and narrow and more centrally placed. It is often somewhat convex on its left border and may be of the so-called "drop" type, an extreme example of which is shown in Fig. 3. The anatomy of the heart as seen in the ordinary postero-anterior roentgenogram is shown diagrammatically in Fig. 4. The upper portion of the cardiac shadow is entirely composed of the large blood vessels while the heart itself extends below the domes of the diaphragm. Two curves are present in the outline of the right border of the heart, the inferior representing the right bor-

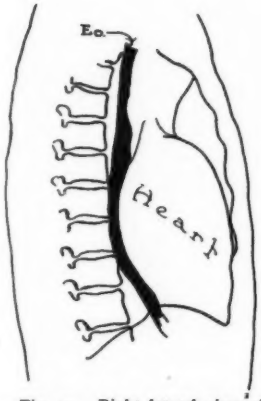

Fig. 10. Right lateral view of barium filled esophagus (Eo) in a case of mitral disease of moderate degree. Note the compression and posterior displacement of the distal portion of the esophagus and the partial obliteration of the space between it and the spine. (Compare with Fig. 6.)

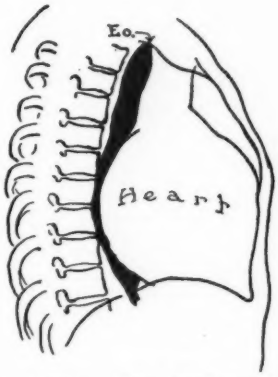

Fig. 11. Right lateral view of barium filled esophagus (Eo) in a case of mitral disease of marked degree. Note the compression and posterior displacement of the segment of esophagus in contact with the dilated left auricle and the obliteration of the space between the esophagus and the spine. (Compare with Figs. 6 and 10.)

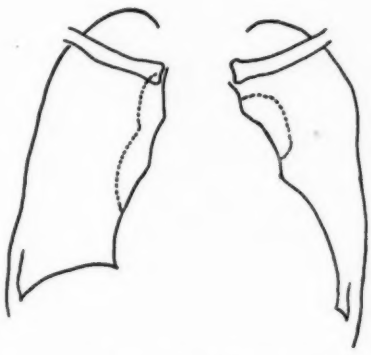

Fig. 12. Outline of heart with combined aortic and mitral valvular disease. Note the marked enlargement of the left ventricle; prominence of the inferior curve of the left border, in addition to the bulging of the conus pulmonalis; prominence of the second curve of the left border. The dilated pulmonic vessels are also shown (broken lines).

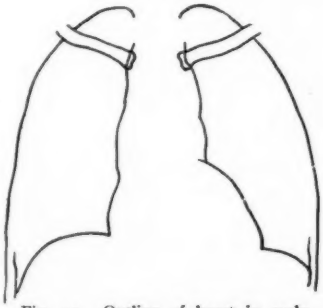

Fig. 13. Outline of heart in early hypertension. Early aortic valvular disease may give the same appearance. Note the concavity of the left border and the prominence of the inferior curve—the left ventricle. There is very little increase in the transverse diameter of the heart.

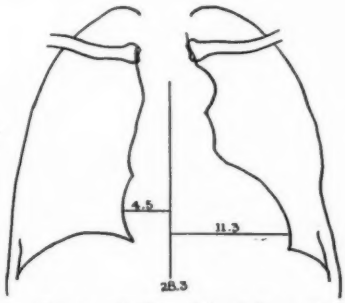

Fig. 14. Outline of heart in aortic regurgitation and stenosis in the second stage. Hypertension may give the same appearance. Note the marked enlargement of the left ventricle—the prominence of the inferior curve. The measurements indicate a marked increase in the cardio-thoracic ratio.

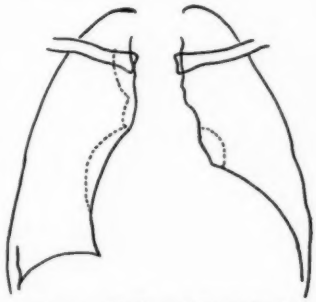

Fig. 15. Outline of heart in long-standing hypertension after repeated decompensation. The tremendous enlargement of the whole heart is well shown but the concavity of the left border and the preponderance of the left ventricle are maintained. The dilated pulmonic vessels (decompensation) are also shown (broken lines).

der of the right auricle, the superior the ascending aorta. On the left side can be seen, from above downward, the arch of the aorta, the conus pulmonalis or beginning of the pulmonary artery, and the left border of the left ventricle. Occasionally the appendage of the left auricle may produce a fourth curve on this side, as illustrated.

A study of this diagram (Fig. 4) will reveal at once what shape the heart will assume with various diseases. In abnormalities of the mitral valve, for example, the right ventricle will be enlarged, the pulmonary artery dilated, the curve of the conus pulmonalis will therefore be exaggerated and displaced upward to the left. The result is that the normal concavity of the left border become a convexity. In aortic valvular disease or in hypertension, the reverse is true. The left ventricle is enlarged and protrudes farther to the left, producing a marked increase in the concavity of the left border, while the aorta itself become broader. In toxic conditions of the myocardium and in myxedema, a diffuse dilatation of the cardiac chambers takes place without affecting materially the large vessels, so the heart takes on a flask shape, the base being narrow, while the inferior portion is broad and flat looking.

The position of the various chambers of the heart and their relation to the esophagus is shown diagrammatically in Fig. 5. This cross section through the thorax indicates that the left

auricle lies posterior to the heart and in close contact with the esophagus. From this it can be seen that enlargement of the left auricle must produce a compression and posterior displacement of the esophagus. Visualization of the esophagus by means of barium sulphate may, therefore, give valuable information, particularly toward the establishment of a diagnosis of mitral disease. The appearance of the barium-filled esophagus in relation to the normal heart is shown in Fig. 6. It should be noted that it runs fairly straight through the thorax and is so constantly present with disease of the mitral valve. Enlargement of the left auricle is almost always present in mitral disease if the patient is having symptoms. Posterior displacement of that portion of the esophagus which is in contact with the left auricle then occurs as shown in Fig. 10 in moderate degree, and in Fig. 11 in marked degree. This sign may be very valuable in deciding doubtful cases.

The type of cardiac enlargement which occurs with disease of the aortic valves, either syphilitic or rheumatic, is essentially the same as that

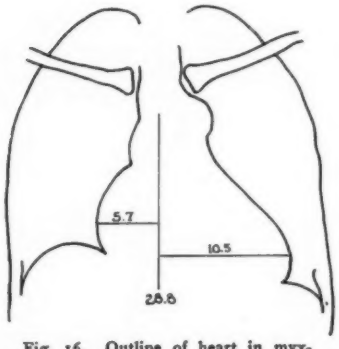

Fig. 16. Outline of heart in myxedema of moderate degree. Note the marked enlargement of the heart both to the right and left with disproportionate enlargement to the right.

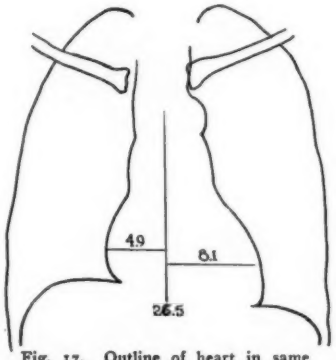

Fig. 17. Outline of heart in same case six weeks after thyroid medication. The transverse diameter of the heart has been reduced by 3.1 cm.

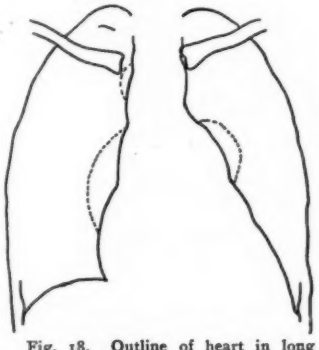

Fig. 18. Outline of heart in long standing chronic bronchiectasis and emphysema. The convexity of the middle portion of the left border is shown due to the enlargement of the right ventricle and to dilatation of the conus pulmonalis. The shape resembles that of mitral disease but in this condition there is no displacement of the esophagus because the enlargement is entirely on the right side.

maintains a distinct space between itself and the spine, while it is in close contact with the posterior wall of the heart.

Brevity necessitates the description of only the most common types of cardiac pathology. Cardiac enlargement from disease of the mitral valve tends to produce roentgenograms such as are illustrated in Figures 7, 8, and 9, all of which are from cases of rheumatic origin. It should be noted that there is a distinct enlargement of the transverse diameter of the heart as well as a change in shape. The left border shows a marked convexity, of varying degree, due to the enlargement of the median curve, which is produced by the right ventricle and the conus pulmonalis. The left ventricle is only moderately enlarged. There is also a marked enlargement of the root shadows of the lungs due to the congestion of the pulmonic vessels which of hypertension. In each case the left ventricle is enlarged. Some minor differences are present but in general it should be considered that the two types cannot be distinguished positively. In the early stages of aortic disease or of hypertension, there is only hypertrophy of the left ventricle. This manifests itself in the roentgenogram by an increased prominence of the inferior curve on the left side and an increased concavity of the left border without any marked increase in the transverse diameter of the heart (Fig. 13). As the disease progresses, dilatation becomes more marked, the concavity more striking. The heart takes on the typical "boot" shape (Fig. 14). In the later stages a more diffuse enlargement occurs, the other chambers taking part in it. At this time the heart may be enormous in size, and enlargement to the right as well as to the left may be noted. The concavity of the left

border and the marked prominence of the left ventricle are, however, still preserved (Fig. 15).

The combination of aortic and mitral valvular disease may occasionally produce a fairly characteristic roentgenogram (Fig. 12). It should be noted that there is marked bulging of the curve of the conus pulmonalis in addition to a very massive enlargement of the left ventricle. The diagnosis of the combined valvular lesions is not always possible, however, as one or the other may so predominate as to give the appearance of a lesion of only the one valve.

Thyroid insufficiency in some cases produces a marked dilatation of all the cardiac chambers. This produces a flask-shaped heart with a broad flat appearance and an especially marked enlargement of the right side (Fig. 16). On thyroid medication this enlargement disappears more rapidly than in any other type of cardiac disease (Fig. 17). Hyperthyroidism, in our experience, does not give any type of cardiac enlargement which is at all typical. Long standing toxemia may occasionally produce a myocardial degeneration which expresses itself by a general cardiac dilatation. The roentgenographic appearance is similar to that seen in myxedema (Fig. 16). Chronic pulmonary disease of many years duration such as asthma, emphysema, bronchiectasis, and fibrosis, may produce right ventricular hypertrophy and dilatation. The roentgenogram of such a heart (Fig. 18) may resemble that of mitral disease but there is no enlargement of the left auricle and, therefore, the esophagus will not show the characteristic posterior compression and displacement.

(Note: The accompanying illustrations, with the exception of Figures 4 and 5, are all made from tracings of original roentgenograms.)

SUMMARY

Organic heart disease usually produces enlargement of one or all the chambers of the heart. A change in size and shape results.

The roentgen method is the most accurate means of determining the exact size and shape. The determination of an enlargement of the heart by this method may thus be the deciding factor in making a positive diagnosis of heart disease.

The determination of the shape may aid greatly in diagnosing the type of pathology present.

Visualization of the esophagus may also assist in the diagnosis, as it may be compressed and displaced by enlargement of the left auricle.

Disease of the mitral valves produces essentially three roentgenographic findings: (1) a distinct increase in the transverse diameter of the heart; (2) a marked convexity of the left border due to enlargement of the conus pulmonalis; (3) a posterior displacement and compression of the esophagus in that portion which is in contact with the left auricle.

Disease of the aortic valves and hypertension produce practically the same roentgenographic findings. Essentially these are: (1) a marked concavity of the left border of the heart; (2) prominence of the left ventricle; (3) increase in the transverse diameter; (4) a general enlargement (late) of the whole heart with the left ventricle predominating.

Thyroid insufficiency may produce a flask-shaped heart which rapidly decreases in size on thyroid medication. Toxic conditions of the myocardium produce the same type of heart. Chronic lung conditions may produce a cardiac enlargement whose shape is similar to the mitral heart but without esophageal displacement.

PRESIDENT'S ADDRESS*

J. S. Holbrook, M.D.
Mankato, Minnesota

PERMIT me to express to you my appreciation of the great honor you have conferred upon me in making me President of this Association for 1928.

May I have the same feeling of pride in having held this position as was recently expressed to me by Doctor M. Sullivan, one of the first members of the Minnesota Valley Medical Association, which combined with the Southern Minnesota Medical Association many years ago to form the present society. He said, "I feel that one of the greatest honors of my life was being President of the Minnesota Valley Medical Association. I always look back to those early days of the Society as the happiest of my life." Doctor Sullivan is now living in Southern California and, although he is about seventy-five years of age, is still enjoying quite good health.

Physicians of that time had to contend with difficulties and hardships which we cannot realize. Think of the poor roads, horse-drawn vehicles, and lack of equipment in their offices as compared with the modern highways, automobiles and modern office equipment. Their knowledge of asepsis and modern anesthetics was limited; they had no radium, *x*-ray, insulin, nor many other things which we use as a matter of course in our daily work.

Recently there came into my possession three old medical books, which I value very highly. One was printed in 1810, or about 118 years ago. This was "The American New Dispensatory" and contained information concerning the older drugs, some of which we use today. The others were the Surgical Works of John Abernathy, Fellow of Royal Society and Surgeon to St. Bartholomew's and Christ's Hospitals in London. These books were printed fifteen years later, or in 1825; not so long ago, as the progress in world affairs is counted.

At that time surgeons were groping in the dark, so to speak, looking for a cause of suppuration, and patients died of infections and inflammations.

Doctor Abernathy was a very fluent writer and his books contain many orations presented to the College of Surgeons, but the bulk of his work was case records. He had a firm belief that the conditions of the liver and stomach caused local diseases. It is interesting to note that whenever a case presented any difficulties, the usual treatment was to give a five grain mercury pill and senna daily, or some other cathartic, and, strange as it may seem, many conditions which the history would indicate as incurable showed wonderful improvement.

He had an anatomical classification of tumors which was interesting.

He did the operations for puncture of the bladder, the removal of tumors, drainage of lumbar abscesses, and removal of floating cartilages from the knee joint, and many others. That the author was well thought of may be judged by his recital of numerous cases in which he was called in consultation.

I ran across the statement which showed that he was well pleased with the progress of surgery of his time, for he said, "Surgery has reached its finality."

This statement set me to thinking and comparing his time with ours. It is said that nearly all operative cases at that time developed pus in the wounds, and if there was not pus present, something was wrong. He reports several cases where healthy or good pus was let out of lumbar abscessess. In phlebotomy he reports several cases of badly inflamed arms because of a poisoned knife, or because the patient's arm was not kept quiet, thus allowing the edges of the wound to rub together and cause inflammation.

Blood letting was practiced frequently. There were shops along the streets where this practice was carried out by the barbers, but at this time the physicians were also using blood letting, and he reports that he had a desperate case which he bled four times in one day, but in spite of this the patient died.

In the Massachusetts General Hospital, there still remains relics of the heroic means surgeons had to take at that time. Without the benefit

*Presented to the members of the Southern Minnesota Medical Association, Rochester, Minn., Oct. 2, 1928.

of anesthetics, the patient had to be tied down securely to assure his remaining reasonably quiet during the operation. In one of the rooms at this hospital one may still see hooks in the walls which were used as anchors for the ropes which secured the patient. The best surgeon was the one who could operate rapidly and who did not let the cries of his patient hinder him. In this very room Doctor John Warren, in 1846, performed the first reported abdominal operation with the patient under ether. At the conclusion of the operation, as the patient was waking up, Doctor Warren turned to the interested group of surgeons present and remarked, "Gentlemen, this is no humbug."

Previous to this time surgeons displayed great courage in doing the necessary limb amputations, skull operations, and occasional abdominal sections without anesthetics or asepsis. But with the discovery of ether and chloroform at about this time a great change came. The instant wiping out for all time of the pain experienced during operations was a great boon to humanity.

The second obstacle to the surgeon's work was sepsis. For example, 6 per cent of all cases of compound fracture died. Now about one per cent result fatally. Operative wounds ran with laudable pus and no wound was expected to heal without it.

Lister, about 1850, began his work in medicine and became one of the most renowned men in medical history, principally because another great physician, Pasteur, had experimented and investigated and found micro-organisms in suppurating wounds. Lister found that he could destroy these germs chemically, and applied this knowledge to his surgical cases. Immediately there was a great reduction in the mortality and at about the end of our great Civil War, Lister made known the results of his discoveries. Antiseptic surgery spread rapidly, and surgeons the world over operated with much more assurance of success.

These two great events—the use of ether and chloroform, and Lister's discovery of antiseptics—have done more to advance surgery than all other discoveries.

I believe that we all feel a great pride in the achievements of our own day. They have not come by any sudden developments but through research work of many men working in laboratories all over the country. I well remember the fiftieth anniversary of the use of ether for anesthesia, celebrated at the University of Minnesota in 1896.

That same year also Behring gave to the world the diphtheria antitoxin, making almost harmless the disease which carried off most of the children and young people of Mankato thirty or forty years earlier. Some of the old physicians used to tell of the terrible experiences with this dreaded disease.

Other discoveries came in rapid succession. In 1896 the roentgen rays developed by the old revolving static machine began to be used. One could take an *x*-ray of the hand in several minutes. A kidney shadow required one-half hour exposure and was very unsatisfactory at that. Improvement in the *x*-ray machine has made possible wonderful films in a few seconds exposure; has made possible satisfactory examinations of the stomach, the kidneys, the colon, the lungs, and the determination of disease of the gallbladder.

Some of the other developments of our time have been announced with such suddenness that one forgets the long weeks or months which were spent in their development. The announcement of insulin startled the world and seemed to most of us to be a discovery almost accidental, but the facts are that research workers all over the world had long been using the pancreas in attempts to find a cure for diabetes.

Typhoid vaccine has nearly eradicated that disease, especially in the Army. The diphtheria, tetanus, and other serums have produced wonderful results. The use of Lugol's solution of iodin in connection with goiter has been very beneficial. Near-miracles are daily produced by the removal of toxic goiters. Many diseases are cured by the removal of focal infection. The liver diet has relieved many cases of pernicious anemia. Chaulmoogra oil has cured some cases of leprosy. There are many other examples of advancement that medicine and surgery has made in the last quarter century.

We wonder what will come next, and many feel like remarking, as Doctor Abernathy did, that surgery (and medicine) have reached their finality.

All these advancements have had much to do with the lengthening of the average life of man. The olden-day physician healed if he could, while

today great stress is being put upon keeping well. Sanitation and preventive medicine, including periodic health examinations, are doing much to reduce to a minimum, sickness and disease, but further increase in the longevity of man will have to come from reduction of the mortality from high blood pressure, Bright's disease, and those conditions which result from the wearing out of human tissues occurring beyond middle life, and also from the eradication of cancer.

If there is anything which the progress of science has taught, it is the necessity of an open mind and the readiness to accept what at first seems startling.

LIVER EXTRACT NO 343

The Council publishes a report of the Committee on Pernicious Anemia of the Harvard Medical School on Liver Extract No. 343. The report outlines the work of the committee in developing a potent liver extract for use in pernicious anemia and the studies carried out with the product of Eli Lilly and Co. which was eventually accepted for New and Non-official Remedies and placed on the market. Subsequently the committee found that certain lots of this product were weaker than the product manufactured for five months previously. Eli Lilly and Co. collaborated with the committee by withdrawing so far as possible this material from distribution. Recent tests have demonstrated that material of standard strength has again been produced and the committee believes that Eli Lilly and Co. can now recommence distribution of the standard product on a commercial scale. (Jour. A. M. A., June 30, 1928, p. 2102.)

TREATMENT OF TYPHOID BY SO-CALLED DETOXICATED VACCINE

The formaldehyde detoxification principle elaborated by Ramon has been applied to typhoid vaccine. The method consists in incubating cultures of the typhoid bacillus with formaldehyde in such a manner that the toxic principle is destroyed while the antigenic properties remain, and is similar in principle to diphtheria toxoid (which has been admitted to New and Non-official Remedies). The number of cases on which this vaccine was tried does not permit the drawing of conclusions as to its value. (Jour. A. M. A., November 3, 1928, p. 1378.)

PERTUSSIS BACILLUS VACCINE

Vaccine made from stock cultures has been used with a great variety of success. Certainly as used it does not prevent all cases, nor does it cure a great percentage of those who have contracted the disease. Its use is not harmful so far as we know and the reactions are slight, if any. For this reason it may seem desirable at times to use it even though results may not be encouraging. (Jour. A. M. A., November 3, 1928, p. 1394.)

THE INJECTION TREATMENT OF VARICOSE VEINS*

ARTHUR F. BRATRUD, M.D., F.A.C.S.
Minneapolis

FOR a number of years, I was performing so-called ambulatory excision of varicose veins. A large percentage of these were complicated by ulcers and were potential infections and for this reason the method was discontinued. A number of patients, where ulcer was present, were treated with parathyroid extract on the theory that these were the result of lowered calcium metabolism. Practically no results could be seen from this method of treatment, excepting possibly in two cases, so it was also discontinued. These cases received the medication by mouth and not hypodermically. They were not given supportive treatment or injections at the time.

Tavel, in 1904, tried to popularize the injection treatment of varicose veins by using a 5 per cent phenol solution, but he met with so little enthusiasm or success that the method was practically discarded by him until after the World War. Linser, working in the Tubingen Clinic in 1911, accomplished good results by the use of one half of one percent sublimate solution. For high situated varicosities, especially near the inguinal region, he used a 15 to 30 per cent sodium chloride solution. However, after the World War it was noted especially throughout France that when a novarsenical product very rich in soda was injected, there was produced a rapid sclerosis of the venous segment injected. This sclerosis of the vein resulted usually without pain, edema, motor interference, trophic complications, or phlebitic reaction. It was soon determined that arsenic was not the causative agent for the venous sclerosis, but that the soda associated was the causative factor. Among the various drugs tried, sodium bicarbonate was rapidly discarded on account of the escharotic action. Sodium salicylate was used and this proved very effective. Sicard and Genevrier were very enthusiastic with the results obtained by using a solution of sodium salicylate that varied in strength from 20 to 40 per cent, the quantity to be injected varying from 2 to 6 c.c. according to the strength of the solution used. J. A. Sicard and L. Ganguir had very good results with biniodide of mercury but this was discarded on account of the painful reaction that resulted on the following day. However, salicylate injections were not successful. Sicard used the biniodide of mercury. Waite uses either quinine or sodium salicylate solution. In the states, of the men who are doing a great deal of this work, McPheeters prefers a sodium chloride solution, while Hayes prefers a bichloride solution.

During the past three years, at the University Dispensary and in my office, I have treated over four hundred cases by the use of sclerosing solutions, and the knowledge gained from this experience will be dwelt upon in this paper.

So many different opinions and theories have been given of the cause of varicose veins that a detailed discussion here is inadvisable, yet a few remarks might be made. There is undoubtedly a hereditary factor to be considered. Obstruction plays a part, as is evidenced during pregnancy, or by the wearing of tight bands or garters. Tumors within the pelvis and probably habitual constipation also play a part. Turner of London lays great stress upon obstruction at the oval window, which is due to an anatomic structural deformity. It is my opinion that varicose veins result from two conditions: heavy work in a fixed standing position, so frequently seen in street-car motormen, laborers and the like; and a hereditary defect or anomaly in the valves of the veins. An interesting phase of this condition is the frequent association of flat feet —estimated by various observers to be between twenty-five and fifty per cent. Just as so many cases of flat feet develop after a prolonged illness such as typhoid fever, so, also, do varicose veins or varicosities develop following such infections.

It does not seem conceivable that with a disability that causes such a varied group of symptoms, some so severely incapacitating, no research work in regard to embryology of the venous system was carried out in detail until Kempmeier's

*Presented before the Northern Minnesota Medical Association, Fergus Falls, Minn., Aug. 20, 1928.

work in 1926 on the "Origin and Mode of Venous Valves." Description of topographical arrangement of veins corresponds quite well in all standard text books. It is Kempmeier's belief that factors underlying functions of valves must be sought, not in the circulation itself but extrinsically, that is, in the effects of compression upon the peripheral venous plexus. Peripheral valves are laid down primarily in areas of muscular activity at the time that the fetus begins to execute skeletal movements, while intrinsic gateways of propulsive force, for example the heart, are laid down much earlier. The first valves of the saphenous veins in the human fetus are laid down and begin to form at approximately three and one-half months and are completely formed at the end of the fifth month of intra-uterine life. They occur first in the upper or proximal end of the saphena magna. In their formation, there is first noticed a pair of inconspicuous or transversely placed endothelial ridges inside the veins. By the invasion of the mesenchyme, the elongation and slanting of the ridges, there is a concavity formed on the leeward side and the anlagen are gradually converted into valval sacs. With this, there is a retardation in growth and a deficiency in the circular muscle development of the tunica media. In the newborn, the vein is only one-fourth or one-fifth as wide at the point of attachment of the valves as in other parts of the vein. The valves are usually bicuspid, but atypical valves either unicuspid or tricuspid may develop. Most valves are located just distal to tributaries or they may follow in close sequence—as many as three valves being found in a distance of 4 mm. As to the number of valves in the veins of the lower extremities, opinions vary. Hess found one in the femoral vein above the communication with the saphena magna in seventy-two per cent of cases, and two in another five per cent. Valves were always present below that point and were almost without exception bicuspid in character. Rarely, was a tricuspid valve found and at times, instead of well shaped cusps, they remained as anlagen—which look like a shallow arched cicatricial contraction or furrow running transversely in the intima of the vein. According to Bardeleben, below the point of entrance of the saphena magna, the valves may vary as low as four, and according to Cunningham as high as twenty. Kosinski, in a study of the saphena parva in a series of one hundred and twenty-four legs, found the aggregate of valves to be between seven and eleven in sixty per cent of the cases —independent of the age or size of the individual, the youngest being twenty-three years of age and the highest number thirteen in two men, one of whom was 88 years of age.

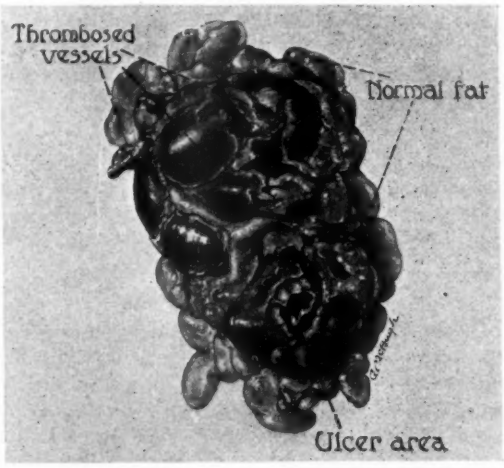

Fig. 1. Gross section showing a slough or ulcer well circumscribed by normal fat and the thrombosed vessels extending into the area.

The symptoms for which patients with varicose veins come for relief may vary from cosmetic reasons only, to those of complete incapacitation. There may be edema of the legs associated with pain of a dull type which may increase to that of cramp so severe as to incapacitate the individual. The cramps usually come on after the patient has been working for several hours and are most commonly complained of by clerks or persons working in a standing position for an extended time. At times, it is difficult to determine whether pain comes as a result of associated flat feet, or as a result of the varicose veins. Edema of the legs is quite common and this may be associated with a recent phlebitis. Ulcers may be present and they may almost completely encircle the leg. They are commonly located on the inner surface of the leg and become more and more frequent as the region of the internal malleolus is approached. This corresponds to the terminal distribution or source of the saphena magna, where the venous pressure is the greatest, especially during the process of walking. Here,

the pendulum movement of the lower extremities must be considered in increasing the pressure. In point of frequency of location, the outer surface of the leg, extending down to the region of the external malleolus, comes next. This marks the terminal source of the saphena parva. If careful examination is made, there will usually be found a venous varix proximal to the ulcer,

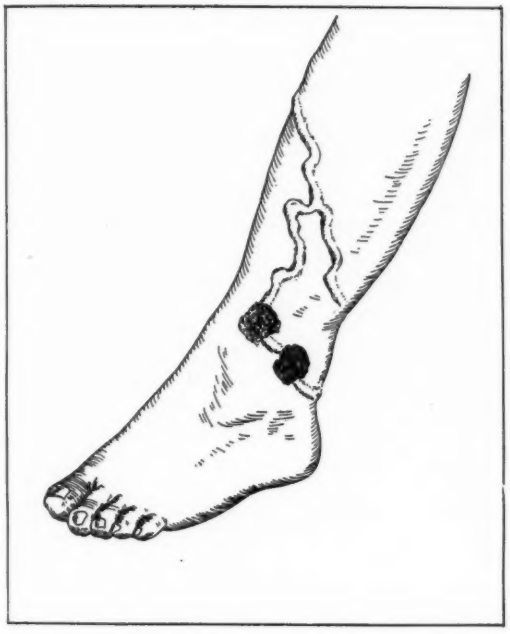

Fig. 2. Ulcers always have a varicose vein extending into the base of the ulcer. It is always present though at times it may be difficult or impossible to see or palpate. The varicosity may even extend from below upward or, as very often happens, it may extend into the ulcer from a lateral direction.

although it may be entirely concealed. Some of these low placed ulcers give almost unbearable pain, especially at night. Occasionally, there is seen an eczema of the leg. Where there is an associated fungus infection, the picture is difficult to differentiate from a malignancy. Itching of the legs may be so severe as to cause great loss of sleep, and slight hemorrhage is quite common as a result of scratching in order to seek relief. A few cases of seemingly incurable eczema of the upper extremities have been reported cured by the sclerosing of varicose veins of the forearm. Occasionally, pain in the region of the knee with inability to flex the leg at the knee is seen. To illustrate this, I am going to report briefly an interesting case that had gone the rounds of medical men.

A fleshy man, 54 years of age, had such severe pain in the region of the left knee as to cause inability to flex the leg. He had been *x*-rayed for tuberculosis and had received the usual anti-rheumatic treatment. An unusually large varix was present below the knee.

The first injection consisted of ten c.c. of invertose according to the technic to be described. Two days later he reported complete relief of symptoms, and two weeks after beginning treatment this man, who had been incapacitated for several months, was pursuing a gainful occupation.

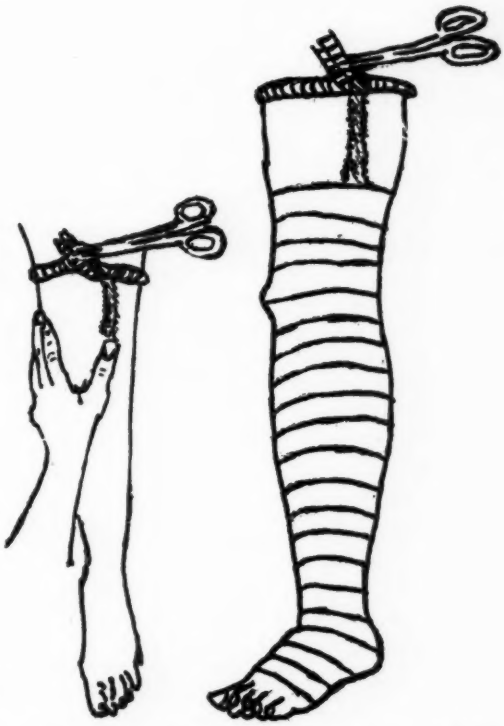

Fig. 3. Method for injection of solution, after emptying leg with or without bandage applied. After veins are almost emptied by elevating leg to a horizontal or higher position, a tourniquet is applied. Then the upper region of the vein can be made prominent by milking the vein in an upward direction, thus causing a lumen of increased size and easier introduction of the needle. With the intertose or glucose solution a needle of No. 19 or 20 caliber is more suitable for injection.

The mechanism of healing of varicose veins after the injection of sclerosing solution was very well worked out by Regard. There is first a swelling of the vessel wall with a separation of the cells of the wall by edema. The cells are bathed in an exudate of lymphatic fluid containing very few leukocytes. The muscle fibres are

shortened as in a state of contraction. The endothelial cells are first swollen and then are detached into the lumen of the vein. There is then a fibrinous deposit formed on the inner surface of the vein. The fibrinous blood clot which forms and fills the entire lumen of the vein becomes organized and constricts the vessel. At first, a fibrinous deposit adheres to the wall, but later, fibrolasts and capillaries penetrate the thrombus. The vein is destroyed by the organization of the thrombus, but in course of time it is transformed into a thin fibrous cord in which only a few muscle fibres are demonstrable. Where the caliber of the vein is large, and thickening of the vein does not take place thereby causing a lumen of reduced size, there may be only the fibrous deposit within the intima, with no resultant thrombosis. Here, there is a quite rapid repair of the injured endothelium with failure to accomplish the desired result. Where the tributaries of the vein to be injected are large, this is very apt to happen.

Tissue infiltration of injected fluid results in a moist or dry slough according to the solution used. These sloughs are very annoying and obstinate to treat, and may require from one to five months' attention.

During the past year and a half, Linser has been using sodium chloride solution according to the technic of V. Meisen, who popularized this solution. It has advantages over the sublimate solution in that large quantities which are necessary in order to thrombose large veins can be used without producing toxic phenomena, with exception that it may produce a hemoglobinuria. However, the sloughs produced with poor or incorrect technic are just as difficult to heal as the sloughs from sublimate solution. Sugar solution in the form of calorose or invertose has been extensively used by Ludwig and Nobl. This solution does not produce sloughs unless injected in perivenous tissues in large quantities.

During the past three years I have been using various solutions: quinine hydrochloride, mercury bichloride, sodium chloride, sodium salicylate, glucose and invertose. The objection to the injection of quinine solutions was that pain and swelling resulted along the varicosities for several days after treatment, and also that quinine may produce undesired results during pregnancy. Some people also have an idiosyncrasy to quinine. Often there was a red, swollen area extending along the tract of the vein for several days. However, the reaction is usually not sufficient to cause the patient to be incapacitated.

With bichloride solution there is always the danger of getting a slough and, though it is not a serious condition, it might be difficult to satisfy the patient in regard to this complication.

Fig. 4. Microscopical section of an obliterated vein approximately one inch about area where a slough had developed. This shows how completely the intima of the vessel is destroyed. It also shows the firm thrombas that has been formed.

Sodium chloride solution in twenty per cent strength offers the same objections and in addition there results an immediate pain or cramp in the calf of the leg, extending to the foot. The duration of this pain or cramp is only about one minute. Sodium salicylate solution in a twenty per cent strength gives very little pain if not over six c.c. are injected. I am using this only in small veins or where several injections are made at one time, or where no thrombus is formed after injection of the invertose solution. Invertose or calorose is to date the most satisfactory of any drug used. There is very little if any pain unless large quantities are used, and even then the pain is only transitory.

The technic which I prefer is to elevate the leg

so as to have the vein as nearly empty as possible. There will be practically no pressure in the vein when the leg is elevated and slightly flexed. A bandage in the form of an Esmarch bandage is applied from the foot upward to a point about one inch from the point to be injected. With the patient in a standing position, a tourniquet is applied about two inches above the bandage so as to render the vein more prominent and the insertion of the needle easier. The patient is then allowed to either lie or sit down. After the needle is introduced into the lumen of the vein, the bandage is either cut or removed so as to allow the sclerosing solution to flow into the collapsed vein. The circulation of blood in a varicose vein is toward the distal end of the extremity and it will be noted that, as the solution extends toward the foot, there is a contraction or spasm of the injected vein. This does not always appear, but when it is seen the result is almost always good. The higher the concentration of the solution that comes in contact with the intima of the vessel, the better the resultant thrombosis. The more collapsed the vein during the process of injection, the better the cosmetic result. A pad of gauze is immediately placed over the point of injection and held firmly in place with adhesive plaster so that no solution will leak out into the perivenous tissues. If there is any pain immediately on injection, it is better to withdraw the needle and inject at another point rather than take chances of placing the solution in the tissues and having a slough.

I have discontinued mercury entirely on account of the danger of sloughs, and the fact that a nephritis may be set up or a pre-existing nephritis exaggerated.

With the smaller veins, injections should always be stopped as soon as pain is complained of, otherwise there may be a rupture of the vein with filtration of the solution into the tissue with a resultant slough. With sodium chloride solution there is always a cramp in the calf of the leg extending down to and through the foot, which usually lasts up to sixty seconds. It is quite severe but not intolerable. A bandage is applied from the foot upward after the injection so as to keep the vessels in a collapsed state.

Bichloride injections are used where the veins are smaller, the quantity varying from one-half to one c.c. of one per cent, or one to three c.c. of one-half per cent being injected while the patient is in the standing position.

A method with which I have had especially good results with large veins and which required usually one or two treatments consists of opening the vein in the middle or lower third of the thigh and injecting twenty c.c. of sixty per cent invertose or twenty per cent sodium chloride solution after completely emptying the vein. Ligation of the vein above the injection was always performed. Recently, in looking over the literature, I found that V. Meisen, Unger, D. Allaines and Roseau had been using practically this same technic with the idea of preventing any complications, especially that of embolism. However, this is the one real and important complication that we do get away from excepting in a very small percentage of cases with the injection form of treatment only.

In ligation of any vein there is a type of thrombus produced that may lead to embolism, as a thrombus is formed that is not adherent to the entire wall of the vein. Here the endothelium of the vessel above the point of ligature has not been entirely destroyed and an adherent thrombus cannot be formed immediately. To date, I know of only two deaths in this country and two others in Europe. Section will show that it is almost impossible to get an embolism with this treatment. V. Meisen advised against injection above the lower third of the thigh because of the fact that he had an ascending chemical phlebitis in five cases. However, these rapidly subsided with rest in bed.

I have seen one ascending phlebitis where sublimate solution was used, but this was not severe enough to cause any worry as it quieted down with rest. Occasionally, if thrombus formation is effected in a large filled vein, it may appear to the patient that the veins are not obliterated and he will worry about the hard knots or lumps in the leg. These will gradually shrink and absorb almost completely in the course of a few months. An ascending chemical phlebitis can be stopped by placing an adhesive strap over a roll of gauze so as to completely compress the vein above the area of involvement. It may not be necessary to put the leg at rest or apply hot packs if this treatment is carried out.

I am satisfied that with proper technic very few complications will result. If sloughs do re-

sult, the necrotic area should be opened directly into the vein and the clot expressed. This lessens the healing period to about four weeks. The slough is very well circumscribed and if this is done in the course of ten days or two weeks, it can be excised nicely by undermining the skin and making dissection through the healthy fat. I have not had a single slough with invertose or sodium salicylate solution, and only two cases of chemical phlebitis with these solutions and they were with a seventy per cent invertose solution. Sloughs can be prevented by injecting the tissue with a normal sodium chloride solution immediately after the solution has entered the tissue.

Indications or guide to treatment rests with the time filling test as well as the symptoms produced. It has been thought that if the filling time was thirty seconds or less, there was an involvement of the deep veins and an incompetency in the connecting or perforating vessels, thus permitting blood to flow to the superficial from the deep system of veins. If the superficial veins did not fill within thirty seconds, the case was deemed amenable to treatment. However, the actual time taken to fill saphenous veins after emptying depends upon the caliber of the veins, number of their tributaries and position of the leg.

If sodium salicylate or invertose solution is used, there are very few contra-indications to treatment. I cannot see any contra-indication in treating selected cases. Bichloride solution should never be used where there is danger of stirring up an already present nephritis. There are cases where the deep veins are destroyed from preceding infection or phlebitis, and here there are large varicose veins which extend above the groin and even up to the axilla. In such cases, the time filling test is of no value and these veins should not be interfered with. It is not advisable to treat a recent case of phlebitis, as there is always danger of stirring up the infection and causing a septicemia or pyemia. Similarly, where varicose veins develop in a patient who has had a previous phlegmacia alba dolens, injection treatment should not be given until a long period of time has elapsed. Also, it is not advisable to inject at a time when there is a great amount of edema present in the leg in any case. With elevation of the leg and hot packs, this subsides very rapidly and the treatment can be commenced.

When ulcers complicate the condition, supportive treatment is absolutely essential. The ulcer should be stimulated by the application of silver nitrate, the strength varying according to the depth of the granulation tissue present. A dressing is applied over the ulcer, over which an ordinary rubber bath sponge is placed so as to cover at least one inch beyond the ulcer area. A bandage is applied tightly from the foot upward so as to cause compression over the ulcer area. It may be necessary in painful cases to give the patient a narcotic for relief of pain during the first day or two. After the ulcer is healed, supportive treatment should be carried out for at least a month—either in the form of an A. C. bandage or an Unnas paste cast.

CONCLUSIONS

The danger of complications in the injection treatment of varicose veins is very small and will be less as the technic is improved.

It is a form of treatment that has to be considered more from an economical point of view than any other form of disability or illness with which we have to deal.

Bad sloughs rarely, if ever, occur with proper solutions, good technic and careful attention to details.

The results, both cosmetic and functional, have more than met expectations.

The injection treatment is much less dangerous than the operative treatment and to date gives more permanent cures where complicated by ulcers.

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AN UNUSUAL CASE OF NUTRITIONAL DISTURBANCE, SHOWING SYMPTOMS OF PELLAGRA, OSTEOMALACIA AND TETANY*

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THE combination of pellagra with osteomalacia and tetany, to our knowledge, has not been reported. We hesitate to attribute the simultaneous appearance of the conditions to mere coincidence. A common cause for all suggests itself. Consequently the case described here is also of interest in regard to the theories of etiology of these diseases. For these reasons we feel justified in reporting this clinical observation even though it has not been possible to investigate the mineral metabolism.

REPORT OF CASE

A woman aged thirty-four years, a nun, came to The Mayo Clinic in April, 1928, complaining of weakness, nervousness, an affection of the skin, and difficulty in walking. She had lived in Missouri all her life. Her family history apparently did not have any bearing on her condition at the time of her registration at the clinic in 1928, although one sister was said to have a slight enlargement of the thyroid gland. During childhood she had had whooping cough, measles, scarlet fever, and diphtheria. Since then she had suffered almost every summer from an attack of diarrhea, which had been attributed to fresh fruits and vegetables, especially to new potatoes. The attacks usually had lasted several weeks, but on subsiding she had been able to eat anything she liked, and those foods which supposedly had been the cause of the condition, without any ill effect. In 1909 an itching, vesicular eruption of the skin had occurred at intervals. This was mainly localized in the interdigital folds and on the extensor surfaces of the knees, elbows and shoulders. Heat, diarrhea, and nervousness were all said to aggravate the condition.

Examination of the patient at The Mayo Clinic in 1915 had not disclosed evidence of a lesion of the skin but the patient had complained of generalized pruritus, and it was noted that she had a colloid goiter. After a remission of six years the condition of the skin had recurred at intervals during the following seven years. Fowler's solution had been given with satisfactory results. Dermatologists had classified the eruption as dermatitia herpetiformis.

In 1917 the patient had entered the convent. One other member of her order with whom she had never been associated had died from pellagra. In 1919 intermittent spells of fever (103° to 104°) had occurred and had been of about four weeks' duration. With this history and that of general weakness and susceptibility to colds, tuberculous infection had been suspected and she had been sent to Denver, Colorado. Her weight had continued to decline; from 70 kg. in 1920 it had been reduced to 54 kg. in 1923. Two years later exploratory laparotomy and appendectomy had been performed. The spleen and the right kidney had been found to be enlarged, and the gallbladder, colon, and duodenum covered by adhesions. Some dental extractions had been followed by a few weeks of fever. About this time, or approximately six years previous to her second admission to the Mayo Clinic, she had begun to complain of "drawing pains" which involved the region of the lumbar spine, the pelvis and the right lower part of the thorax. This condition had been associated with tightness of the abdominal muscles which had made it difficult for her to stand in an upright position and which had been noticed first when she attempted to get up from a sitting position. Walking gradually had become difficult, and since January, 1928, she had been obliged to use crutches. During the same six-year period, cramps in the hands and in the feet along with twitching of the eyelids had occurred occasionally. At times symptoms had been coincident with the attacks of diarrhea. In August of 1927 a lesion of the skin had developed, quite different from the earlier lesion. This had consisted of symmetrical, dry, red areas which had appeared in the region of the wrists, elbows, knees, neck, shoulders, groins and external genitalia and was diagnosed as pellagra. Oligomenorrhea had existed for three years and had been followed for the last two years by complete amenorrhea. Urinary frequency had been present during this time.

On admission to the hospital in April, 1928, the patient weighed 43 kg. and her height was 164 cm. (table 1). She could walk only a few steps without the help of crutches. The thorax appeared bent forward and movements of the legs seemed difficult. When she was walking, there was barely any bending at the knees and hips and the feet were dragged along the floor with a jerking motion which started from the pelvis.

The frontal portion of the patient's skull was rather large and was of square shape. A boss was present at the juncture of the two parietal bones. In the tho-

*Work done under the supervision of Dr. Leonard G. Rowatree and Dr. Charles S. McVicar, Division of Medicine, The Mayo Clinic, Rochester, Minnesota.

racic region of the spine there was marked kyphosis and left scoliosis and there was almost no compensatory lordosis in the lumbar area. The right lower portion of the thorax bulged laterally and forward. The curves of the clavicles were slightly exaggerated. There was marked thickening of the chondro-osseous juncture of the right fifth rib and of the tenth and eleventh ribs on both sides. The sternum and the lower ribs were tender to pressure. As a result of the kyphosis of the spine, the costal margins approached the pelvic brim and this allowed the abdominal wall to be retracted in a deep, transverse groove. The symphysis pubis was rather prominent; the acetabula were deepened; the promontorium pushed forward; the sacrum tilted, and the pelvic outlet narrowed. In striking contrast with the bones of the trunk, no change was discovered in the bones of the extremities. Roentgen-ray examination revealed, besides the foregoing deformities, a marked degree of osteoporosis in the bones of the trunk. The sella turcica was of normal dimensions and outlines. Signs of fractures could not be found.

Examination of the skin showed symmetric, well demarcated, dry, red areas over the lateral parts of the neck, in the regions of the groins and external genitalia, over the elbows, on the shoulders, and on the dorsum of the wrists and in the knee pits. Of the vesicular type of skin lesion, described in the history, nothing was noticed on admission. We repeatedly observed that groups of small opaque blisters formed mainly on the arms, and decidedly less frequently on the trunk. Iodine seemed to aggravate the vesicular form of dermatitis, whereas Fowler's solution apparently caused it to disappear.

Examination of the eyes did not reveal any pathologic change. The absence of opacity of the lenses was noteworthy. The teeth seemed well formed and well arranged, but there was considerable pyorrhea. Signs of stomatitis were absent. The tongue was clean, was not very red, and the edges were smooth and atrophic. The tonsils were of medium size and were deeply buried.

The thyroid gland was of a fine nodular type; its left lobe was enlarged approximately to 2 by 2 by 3 cm. Bruits or thrills were not noticed in the region of the thyroid vessels. Except for impure breath sounds over both apexes and a soft, systolic heart murmur in the pulmonic region which was not propagated, general and roentgen-ray examination of the thoracic organs were negative. The pulse was regular, the rate varying from 70 to 106 beats each minute, and the blood pressure ranged from 94 systolic and 68 diastolic to 104 systolic and 78 diastolic. The abdominal wall bore a surgical scar and was retracted in a deep transverse groove, as mentioned. Abnormality of the internal pelvic organs was not found.

Neurologic examination did not reveal any sensory changes. The knee jerks were hyperactive. Chvostek and Trousseau signs were positive and galvanic stimulation of the ulnar nerve showed marked hyperexcitability. The internal hamstring muscles of the left lower extremity were more hypertonic than those of the right.

On proctoscopic examination the mucosa of the rectum appeared normal. Parasites or ova were not found in the stool. Urinalysis showed an occasional faint trace of albumin. Bence-Jones protein, acetone bodies and indican were absent. Other laboratory data may be noted in table 2. The hypocalcemia and the elevation of the basal metabolic rate are important.

While the patient was under our observation she had a few attacks of tetany with typical carpopedal spasms. Injections of calcium chloride and parathormone checked these promptly. We refrained from the prolonged administration of the parathyroid preparation, fearing that it might lead to depletion of the calcium deposits in the bones. Calcium lactate was prescribed in doses of 5 gm. twice daily. Following the suggestion of Roe and Kahn, it was dissolved in water and was given two hours before the first and two hours after the last meal of the day. Ten drops of compound solution of iodine given three times daily reduced the basal metabolic rate to normal within eight days. On discontinuance of this medication, the rate of metabolism returned to its former level. The symmetric abnormal areas on the skin which had existed for only eight months disappeared almost completely. Whether this was the result of the "high vitamine" diet, including cod-liver oil, irradiated ergosterol and yeast, cannot yet be determined.

TABLE 1. MEASUREMENTS

Height		
Vertex of skull to heel, cm.		164.0
Vertex of skull to iliac crest, cm.		63.0
Iliac crest to heel, cm.		101.0
Circumference of thorax		
At level of:	In inspiration, cm.	In expiration, cm.
Armpits	75.5	72.5
Breasts	77.0	74.0
Seventh rib	79.3	77.0
Diameters of thorax		
Anteroposterior level of seventh rib, cm.		20.0
Lateral level of seventh rib, cm.		25.0
Diameters of pelvis		
Interspinous, cm.		22.0
Intercristal, cm.		26.0
Intertrochanteric, cm.		28.5
External conjugate, cm.		22.0

The diagnosis was pellagra, osteomalacia with tetany, and dermatitis herpetiformis.

COMMENT

The clinical picture of pellagra is characterized by symptoms referable to three systems: to the skin, in the form of a symmetric erythema or dermatitis; to the digestive tract, mainly as stomatitis and diarrhea; and to the nervous system, as nervous and mental changes.[37] The disease is more prevalent in warmer climates than elsewhere. Seasonal variations are definite; exacerbations come in spring and fall.

The dermatitis which affected the neck, shoulders, elbows, wrists, groins, and knees of the patient reported here was indicative of pellagra,

whereas the asymmetric vesicular type of skin eruption was considered by the dermatologists at the clinic to be evidence of dermatitis herpetiformis.

Although there were numerous indications substantiating the diagnosis of pellagra on the basis of skin symptoms, diarrhea was the only symptom referable to the digestive tract. It had been present intermittently for more than twenty years before the pellagrinous lesions of the skin developed. However, stomatitis, increased salivation and anacidity were absent. The nervous symptoms were exaggeration of tendon reflexes and cramps; these are not uncommon in pellagra.[35] Mental or sensory changes were absent. Concerning the rise in metabolic rate, the only records of the basal metabolism in pellagra which we were able to find, showed a considerable elevation in rate in four out of six cases.[16] Pellagra is not responsible, to our knowledge, for deformities of bone.

The etiology of the disease is still unknown. Since the time when Casal first described it in 1762, its cause has been attributed to faulty food. For many years, the excessive use of maize, the formation of a toxin from the mould of this plant or the removal of substances from maize by certain methods of preparation, was thought to be the cause of pellagra. But with the widespread appearance of the disease in North America in the first decade of the twentieth century, the investigators abandoned the theories in which maize was concerned and centered their interests on the question of infection,[33] and deficiency of food.[10] The latter view perhaps has had more experimental support, although we do not yet know whether the deficiency lies more in an inadequacy of the supply of protein, of mineral or of vitamin.

The pathologic process which underlies osteoporosis is decalcification of bone tissue, which ultimately leads to atrophy and to weakness of the skeleton. Clinically, this becomes manifest by increased fragility, as illustrated by fractures, or by deformation of bones. Osteomalacia, on the other hand, shows histologically not only decalcification but, at least in adults, formation of osteoid substance.[17] The softening of the bones is more marked than is the increase in their fragility; consequently deformities appear more frequently than fractures, and usually they appear earlier. The disease also is not limited to skeletal changes. The question whether osteomalacia and adult rickets are indentical conditions is still under discussion.[6, 7, 11, 23]

Osteomalacia affects women mostly; rarely, it affects men. It is characterized, clinically, by pain, muscular weakness, and bone deformities. Pain occurs at first only on pressure; particularly is this true of the lateral parts of the thorax and the spine. Later movements become painful, and finally spontaneous pain localizes, usually symmetrically, in the lumbar and sacral spine. Weakness of the ileopsoas muscles, with contractures of the adductors of the thigh and pressure pains of the bones, are helpful as a diagnosis triad before the occurrence of deformity of the bones.[19, 25] Deformity involves, in adults, mainly the bones of the pelvis, the spine, and thorax; in younger persons, not only these but also the bones of the lower extremities are affected. The deformity of the pelvis is generally detected because of its function in relation to pregnancy. The changes in the thorax are characterized by shortening of the transverse and lengthening of the anteroposterior diameters. The vertebræ become flattened; kyphoscoliosis develops in the spine; the abdominal wall is drawn in and a transverse groove forms which is typical of the disease. The "duck-gait" of osteomalacia is considered a result of tenderness, deformity, muscular weakness, and disturbance in innervation of the muscles. Scott described it as a mixture of jerking, waddling and shuffling. The calcium content of the blood is decreased, and normal or subnormal values are found for the alkali reserve and for blood phosphorus. In the active stages of the disease, the calcium output exceeds the calcium intake,[21, 22] and the content of calcium and phosphate in osteomalacic bones is very low.

Osteomalacia is frequently associated with active or latent tetany. According to György, this association occurs in 20 to 70 per cent of the cases. In regard to the etiology of osteomalacia, medical literature abounds in theories,[30] but a few have gained especial recognition. For example, abnormalities of almost all of the known endocrine glands have been suspected as the cause of this condition. The long-discussed ovarian theory of osteomalacia fell into disrepute only after repeated experiments with a large number of patients.[11, 20, 21] The relation of h[illegible]erthyroidism, hypocalcemia and bone chang[illegible] fre-

TABLE 2. LABORATORY DATA

Date	Blood chemistry: Calcium, mg. per cent	Blood chemistry: Phosphorus, mg. per cent	Blood chemistry: Chlorides, mg. per cent	Blood chemistry: Urea, mg. per cent	Carbon dioxid combining power, per cent	Acid hematin, per cent	Hemoglobin, per cent	Erythrocytes	Leukocytes
4-20							54	4,090,000	8400
5-11	6.30	4.5							
5-14	6.20	4.4							
5-18	5.53		631						
5-19	6.35			16					
5-21	6.25								
5-22	6.59		629						
5-23	6.99								
5-24	6.48								
5-25	6.43								
5-26	7.58								
5-28	7.53						60	4,750,000	
5-29	7.18	4.5							
5-30	7.28								
5-31	6.69								
6- 1	6.49								
6- 2	6.49								
6- 5	6.95								
6- 6	6.67								
6- 7	7.09						48	4,270,000	
6- 8	7.46								
6- 9	7.13		623						
6-16	7.26	2.3					39	3,960,000	
6-25	6.10						48	4,150,000	
7- 7	8.30						55	3,840,000	6500
7-10	7.20	3.8							
7-13	7.70								
7-20	7.30	2.9							
7-30	7.50								
8- 6					42	9.5	46	2,970,000	5500
8-13	6.40	4.3							
8-16	6.70	5.3							
9-20	7.80	3.4			48		55	3,370,000	2700

April 20, test meal: total acids 38, free hydrochloric acid 18, amount 35 c.c.

Basal metabolic rate:

May						August		September						
18	19	22	26	28	29	28	29	1	3	5	7	16	17	19
+17	+31	+18	+32	+28	+29	+33	+31	+28	+16	0	+7	+18	+27	+25

Differential blood count:

	July 7	August 6	September 20
Lymphocytes, per cent	41	24	31.5
Large mononuclear leukocytes, per cent	0	0	1.0
Transitionals, per cent	2	1	1.5
Neutrophils, per cent	54	70	64.0
Eosinophils, per cent	3	5	2.0

Coagulation time (Lee), five minutes three seconds. Treatment by calcium from May 20 to September 22. Treatment by parathormone from May 20 to June 2; June 7 to June 9, and on June 23. Compound solution of iodine given from August 29 to September 6.

quently has been discussed[2, 15, 16, 24, 36] and the thyroid origin of osteomalacia was postulated.[14] In the light of more recent investigation, participation of the thyroid in osteomalacia appears doubtful, but the coincidence of this condition and goiter is surprisingly frequent.[1, 3, 13, 29] The climatic and dietary theories, as borne out in numerous cases in India and China, would seem to be the nearest to the real crux of the yet undetermined cause. Osteomalacia, either with or without tetany, is unusually common in India[11, 28] and China.[21] In both countries the disease flourishes among those people who are undernourished and who live in close, dark, unventilated quarters; therefore, in discussing etiology, nutrition and general hygiene receive much atten-

tion. But, especially in India, the women who are compelled to follow the purdah system, which keeps them almost constantly confined within doors, are victims of the disease. In China it is most common among the women of the middle class who are too proud to work and are too poor to feed themselves adequately. The people who are still poorer, and are obliged to work outdoors, are not affected. Renewed interest arose when osteomalacia appeared in the larger cities of Austria and Germany during the World War.[1, 12, 13, 27] With these observations on record the conclusion has now been reached that insufficient supply of food, possibly combined with lack of light, are the chief, if not the only, causes of the disease. As therapeutic measures, cod liver oil with calcium and light, as well as phosphorus,[1] irradiated ergosterol,[12, 32] olive oil and strontium[1] are enthusiastically recommended.[12, 13] According to Flamini, cod-liver oil activates metabolism of calcium, particularly diffusion of calcium, through the intestinal wall. Miles and Chih-Tung Feng found that calcium alone did not alleviate the disease, whereas cod-liver oil alone, or combined with calcium, led to rapid improvement.

The coincidence of pellagra and osteomalacia with tetany in one person is not so surprising if one assumes a nutritional deficiency as the cause of both conditions. However, although we believe that the clinical picture presented by this particular case can be explained on the basis of a nutritional disturbance, we do not know which element of food is lacking. Repeated attempts to trace a deficiency in the patient's diet failed. However, one month after the institution of a high-calorie and vitamin-rich diet, our patient menstruated and she has continued to menstruate at regular intervals ever since. For the two previous years she had not menstruated.

The patient gave a history of good hygienic conditions and of much time spent in the open air. Incidentally, however, the costume which she wore allowed, as indicated by spectrophotometric measurements, less than 1 per cent of the total spectrum to penetrate the dark material. Whether this fact has any bearing on the patient's condition is not known.

Theoretical considerations induced a search for a gastro-intestinal disorder which might interfere with resorption and which might cause these symptoms in spite of a sufficient and well-balanced diet. Conclusive evidence of such a lesion was not found. Likewise, for theoretic reasons, the possibility of an endocrine disturbance, which might hinder the normal utilization of food, had to be considered.

In a few cases of osteomalacia with tetany, changes have been found in the parathyroid glands.[8, 20, 34] Most frequently histologic evidence of parathyroid disease is lacking, but there is still the possibility in this disease of functional disorder of this gland.[12]

The elevated basal metabolic rate, the mild intolerance for heat, and the slight enlargement of the thyroid suggested thyroid disease. Its relation to osteomalacia has been referred to earlier in the paper. The administration of iodine solution promptly reduced the basal metabolic rate to a normal level, but it had no influence on the diarrhea. Upon discontinuing the iodine solution the rate again returned to the previous level. Clinical evidence, however, is so scant that we do not feel justified in making a diagnosis of hyperthyroidism.

Physical or roentgenologic evidences of disorder of the pituitary gland or of the thymus were not found. Simmond's cachexia did not seem to explain the clinical picture, and there were no signs to prove suprarenal insufficiency.[5] It has become almost a fashion to cover ignorance by attributing every disorder to pluriglandular deficiency. According to Alwens, insufficient nutrition leads to pluriglandular disturbance, but theoretically the inverse process may also be possible.

The unusual clinical picture in this case seems best described as a combination of the syndromes of pellagra, osteomalacia and tetany. It is probably a nutritional disturbance, the cause of which is not known. Deficient supply of food or light, a hormone disturbance, or a gastro-intestinal lesion are possible pathogenetic factors.

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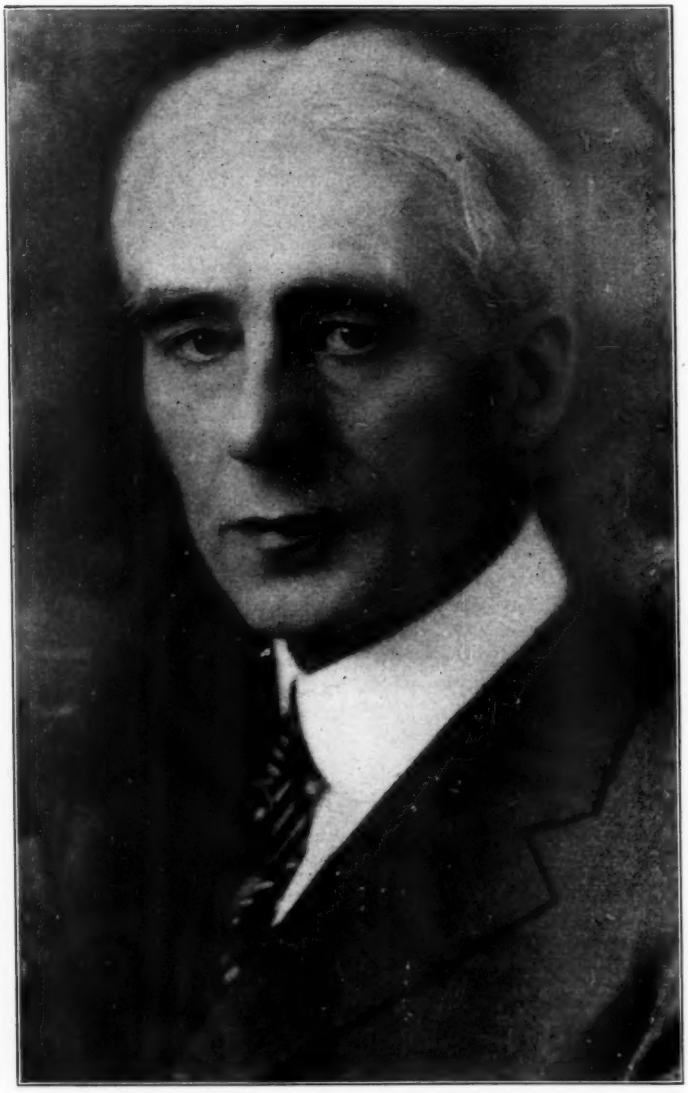

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EDITORIAL

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THE FLOP

Have you ever encountered a "flop"? Perhaps you have and didn't recognize it. It might be well for members of the medical profession, especially those employed by insurance companies in industrial compensation cases, to be on the lookout for flops for quite a bevy has recently been uncovered in New York.*

A flop is a professional petty crook who makes a business of getting into accidents in order to collect disability insurance. The flop is employed or abetted by a crooked lawyer to scout around through certain parts of the city for such openings or defects best suited for feigning injury, such as an open cellar door, a broken step or a defective manhole. The flop would then take his flop and feign injury and an accomplice would be at hand to render assistance, call the police, get the names of witnesses and take care of the presumably injured flop, for as a rule he would refuse to be taken to the hospital, where the fake might be more readily detected.

According to the investigation recently made in New York City one flop took as many as one hundred flops in a little more than a month and as high as eight in one day, necessitating two ambulance calls.

Fake automobile accidents were employed, the driver assuming the responsibility to assure more prompt settlement. A collision between an automobile and a street car would offer an unusually good opportunity for inducing a number of persons to pose as victims. In each case the lawyer would furnish most of the story.

No difficulty seemed to be encountered in obtaining a crooked doctor to furnish medical reports on the supposed injury. The doctor might prepare as many as ten certificates at a sitting at two dollars each from information obtained perhaps over the telephone. Examination by the physician for the insurance company did not serve to cripple the fraudulent schemes as sufficient excuses for delay could be made to defer such examination until a time when the supposedly injured individual should be recovered.

We suspect that the policy of some insurance companies made such an undertaking possible. It was doubtless cheaper to settle a small claim without too extensive an investigation. That advantage should have been taken of such a policy to frame up small claims by the wholesale proved an unexpected revelation.

*Cooper, Irving Ben: Barter and Sale of Patients and Clients. The Panel, October–November, 1928.

OLD AGE

Since earliest times man has attempted to avoid or postpone the period of old age with its

shadows of inactivity, dependence and impending death. To the medical profession belongs the credit of lengthening the average life anywhere from one to ten years but it is a question whether this has postponed or merely lengthened the period of old age. Present styles of manners as well as of dress make for the illusion of youth, and age can be disguised more than ever before. At the same time more education and longer training periods are constantly raising the age of economic independence while modern high pressure business efficiency demands an earlier retirement age, thus materially shortening the productive years.

Then arises the question of what to do with these extra years that are being conferred upon men and women. Since the medical profession is largely responsible for them it becomes partly their problem. The first attempt at solution was a recent conference upon old age held by the New York Academy of Medicine and attended by physicians from all over the country. So important did this seem to the lay world that the popular news magazine "Time" (Oct. 22, 1928), carried a detailed description of the conference and reported that it presented much of different diseases but very little of the general hygiene of old age.

The diseases of senility are important but yet more important is a consideration of the factors which would make old age a time of contentment and happiness instead of dependence and disillusionment. The point of economic independence has been well stressed but does not solve the whole problem, for a rich old person is not always a happy one. William Vaughan (A Doctor's Memories) says that each man meets old age as either a fool or a philosopher and that the latter accepts the limitations as well as the privileges of each age and further says, "For myself the pleasure of living has grown." Carl Ramus (Outwitting Middle Age) feels that senility can be avoided or postponed by eating light food and "thinking young thoughts." Logan Clendenning (The Human Body) feels that periodic health examinations upon apparently normal old people do more harm than good by limiting their activities and making them self centered and apprehensive so that their extra years bring them little of either pleasure or comfort. Maurice Duplay (Our Doctors) emphasizes the importance of interest in the activities of other people and says, "One gets so much pleasure from just looking." Our own Dr. Sweeney (MINNESOTA MEDICINE, October, 1928) advised the cultivation of more interests during the formative or plastic years of life, thus preventing the "one track mind" which has no resources after the main ambition has been accomplished.

There is no doubt that physiological old age is very different from chronological old age and each case must be considered by itself; but the fact remains that if the last years of life are to be pleasurable or profitable the problem must be studied from a psychological as well as a physical point of view. Years of saving, during the productive years, for the dependent years has been preached but nothing is ever said of preparation for the mental life during the dependent years. Interest in living is just as important as financial independence and the art of living must be learned during the early formative years if the declining years are to be enrichened. Many physicians have developed avocations which, after active practice is over, proved to be either lucrative or interesting or both and resulted in distinct contributions to the knowledge of the world. The man who has the trait (often acquired) of making friends, who finds comfort in books or pleasure in music, who has an active interest in the affairs of the world, who is vitally interested in people and their doings, who has a philosophic mind which enables him to change his interest and activities with the changing years, and, best of all, who has a beloved hobby or avocation, has little to fear from old age.

MARGARET WARWICK, M.D.

W. H. EUSTIS

The life of Mr. W. H. Eustis demands the attention of the medical profession. The generosity of the former mayor of Minneapolis laid the foundation for medical activities which in the years to come will do an immeasurable amount of good to a multitude of crippled children throughout the state. A cripple himself, he realized better than anyone not so afflicted the handicap a crippled child has in the struggle of modern day life. The wealth that he accumulated as a re-

sult of keen business judgment has been given *in toto* to furnish medical and surgical aid to crippled children. The term cripple is used in a broad sense to cover not only those children crippled through bone and joint disease but those handicapped in any way through accident or disease.

More than five years ago a tract of land on the bank of the Mississippi river was given to the state as a site for a convalescent home for needy crippled children and the adjoining property where the Michael Dowling school now stands was also donated. Mr. Eustis' entire fortune of a million and a half has been bequeathed to build and endow the hospital, which will be known as the Minnesota Hospital and Home for Crippled Children.

Mr. Eustis was born in the village of Oxboro, New York, July 17, 1845, of English parentage. He died in Minneapolis November 29, 1928, at the age of eighty-three. Robust as a child, a crippling accident at the age of fifteen forced a complete change in his life. The difficulty he encountered in obtaining proper medical advice and the obstacles met in obtaining an education resulted in his decision to devote his wealth to assist others similarly handicapped.

His generosity is an inspiration in an age when wealth is so commonly thought to be an end in itself. How much better to be remembered by posterity in this manner than, for instance, by a building towering above all others, desirable as a skyscraper may be.

The generosity of wealthy individuals, notably in the eastern part of our country where there is more concentration of the country's wealth, has been responsible for much alleviation through medical agencies of human ills. The widespread generosity of not only our millionaires but the well-to-do in general is an outstanding justification of the institution of private property. The fine example of Mr. Eustis merits emulation.

HISTORICAL COMMITTEE

We present this month a portrait of the first physician to locate in Minnesota for the practice of his profession. Army surgeons were stationed at Fort Snelling, or Fort St. Anthony as it was called in those days, at its establishment in 1819, and medical missionaries came to Minnesota in 1835. Our country was then part of Michigan or Iowa territory. The portrait above is that of

CHRISTOPHER CARLI

Dr. Christopher Carli of Stillwater. Dr. Carli came to Stillwater in 1841, and lived there until the time of his death in 1887. Who was the first physician in your town? When did he come there?

Next month we shall tell you another—how a physician by bringing his property to Minnesota started something that was a contributing cause of the Civil War. Now you tell us one. Send it to Dr. H. M. Workman, Tracy, Minn., Secretary of the Historical Committee, Minnesota State Medical Association.

J. M. A.

PRESIDENT'S LETTER

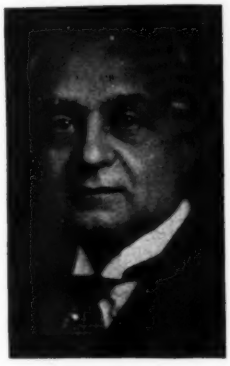
THE accomplishments of the year 1928 are now history. Great as they have been we trust the year 1929 may show as great or if possible greater progress. Let us, every one, begin the year with a determination to do at least some one thing to keep the spirit of scientific medicine moving ever onward and upward. A good slogan to start the year is "No diphtheria in Minnesota in 1930." The activities of Dr. Pierce's committee and their plans for a state-wide toxin-antitoxin program should appeal with a great deal of force to every member of the State Association. It is a foregone conclusion that if this more than worth while endeavor to stamp out this dread disease by a method at once so simple and so devoid of untoward results is not taken in hand seriously by our profession, it will be promoted by some of the many lay health organizations spreading in the State. These organizations are certainly not in a position to push a campaign of this nature to a successful conclusion in any such degree as a united medical profession.

May I in this, my initial message, bespeak your hearty cooperation for this most worthy project.

MISCELLANEOUS

DR. C. LEVADITI VISITS NORTHWEST

The Twin Cities and the Northwest were privileged to have the pleasure of a visit from Dr. C. Levaditi of the Pasteur Institute, Paris, France, eminent scientist, known throughout the entire medical world for his many noted researches and discoveries in medicine.



C. LEVADITI

Dr. Levaditi came to the United States on a scientific mission, visiting the Mayo foundation at Rochester, where he did some work in collaboration with Doctor Edward C. Rosenow of the Mayo foundation. He also delivered lectures at Harvard University, University of Michigan, and a few other leading medical centers, including a visit to the University of Minnesota bacteriological laboratories. He remained in Minneapolis a few days as guest of Mr. George G. Ulmer of the Physicians and Hospitals Supply Company.

Dr. Levaditi is internationally known for his many researches, and particularly his development of a new bismuth cure for syphilis. He was the first to use bismuth compounds in oil suspension for the successful cure of this disease. The extent and completeness of his work is evidenced in the works published by himself and edited by Masson and Company, Paris, France, under the heading "Bismuth in the Treatment of Syphilis." Since the publication of these works, Dr. Levaditi has developed a new and improved bismuth compound which is claimed by many authorities to be more efficient than present known remedies in a great many cases. This product has been effectively demonstrated to cure syphilis in various stages, and properly used has no toxic effect.

Among some of his other works are the determination of the filtrable virus of infantile paralysis, the staining of syphilitic spirochetes on slides, researches on lethargic encephalitis.

His latest honor in the medical world was the recent award of the Cameron prize.

Among the many scientific bodies of which he is a member is the French Academy of Medicine.

Dr. Levaditi was greatly impressed by the research work being carried on at the University of Minnesota, and the Mayo Foundation. He was exceedingly impressed with the extensive development of the Northwest in both scientific and business activities and enjoyed the beautiful scenery and the kind hospitality evidenced everywhere.

THE WRITING OF MEDICAL PAPERS

ABSTRACT OF MAYO FOUNDATION LECTURE
BY
DR. MORRIS FISHBEIN

Dr. Fishbein said that the history of medical writing is as old as medicine itself, inasmuch as the first man who made an observation he thought was important recorded it. Medical men have always been interested in literature; the first daily newspaper was founded by a physician and the first city directory was published through the stimulus of a physician.

The first great medical journal was the *London Lancet,* instituted in 1823. Following that, in this country the *Boston Medical and Surgical Journal* was founded in 1828. Twenty years later Oliver Wendell Holmes pointed out that the medical literature of this country was largely copied from the English and that the portion which was original was uncouth. In his time there were twenty medical journals in this country; today there are 265.

The manuscripts making the bulk of the content are papers prepared by physicians to read before medical societies and serve the double purpose of education and legitimate advertising. Therefore the writing of medical papers goes on as a business and profession for the purpose of informing men as to what is happening and also who are available for certain operations.

Dr. Fishbein said that men are anxious to have papers published in the good journals as it is considered a sort of award of merit. The reasons why they fail are simple reasons. The first reason often is that the man has not kept in mind the nature of the publication to which the article is to be sent. The first thing an author ought to do in selecting a medium for publication is to consider the nature of the medium and the relation of his article to it.

The second reason for failure is that the author has been too hasty in assembling his material for publication. Manuscripts are being returned constantly because the author has not completed the work but has rushed into print with observations which are, in every sense of the word, preliminary reports.

The third reason is that manuscripts prepared in the first place to be read before medical societies have not been re-prepared for publication. It is safe to say that a manuscript prepared with the idea in mind of reading it is not fit for publication. It is possible for a man through personality to hold an audience while he digresses; the reader of a periodical is not likely to spend time looking over anything but new material given in a brief form. He wants conclusions at the end and a summary so that the information may be digested rapidly.

Often material has not been assembled with the same systematic care that is used in surgical procedures. Dr. Fishbein is convinced that many physicians write papers in this manner: The doctor asks his secretary to get out so many references; he put them aside and asks her to get out a certain number of case reports in that particular field. These are gradually assembled and

then some evening he tells his wife that he will stay home from the movies and get to work on the paper, two days before he has promised to have it ready. He fills in some references and ends with copies of the case records, just as the notes were taken by him when he saw the patient.

There is another style adopted by the man anxious to make his presentation dramatic; he has heard that the reader's interest must be captured immediately. Dr. Fishbein read a ludicrous example of this style. Another man wished to show that he was well read and started his paper, "After a search of the literature I can't find. . . ."

Probably the best rule of style to follow in publications is to recognize certain fundamental facts in the presentation of scientific material. Scientific material does not demand embroidery or ornamentation: it demands first of all presentation of fact. The important factor is to get down the facts important in making a decision, and it is just as important that all facts which have no bearing on the case be left out. The manner of excluding data in reporting postmortem examinations is a question of the greatest importance in submitting manuscript. It can be taken for granted that when a man makes a postmortem examination he will carefully observe all lesions and will know when certain observations are of significance.

The case report is the basis of all medical literature. Dr. Fishbein said that the case report as it appeared in American medical literature between 1890 and 1910 was probably the worst example of medical writing. It started out with a long case number, the initials of the patient, and so forth and these locutions came to be so common that one lost all interest in reading the reports of cases. Dr. Fishbein recommended for comparison the writing of Sir William Osler. The modern form of recording cases in clinic and hospital, as taught to many interns, is telegraphic form. It involves phrases instead of sentences and the use of abbreviations which no one outside can interpret. In one paper L. L. L. N. R. was discovered to mean "left lower lobe no râles." Any manuscript received by the *Journal of the American Medical Association* with a considerable number of abbreviations is returned.

The average author who sits down to write thinks first of a title; the good author looks over the paper after it is finished and then puts down the title. The matter of titles has given pause to all because medical literature depends for its permanence on its indexing. Indexers are not all trained to read the article through and are likely to take the titles. Titles which do not indicate the subject matter and titles which are too long are equally bad. It is also important to know the author's name. Few medical authors adopt a name and stick to it; it is difficult to place the man who one time writes his name with two initials and the next, perhaps, uses the first name and middle initial.

Dr. Fishbein believes that the worst phase of medical writing today is the use of medical jargon or slang. Although doctors say that they cystoscoped the patient he is glad that they do not yet say that they microscoped a slide. He thought that the physician is likely to make a great many mistakes unless he defines the terms he is using. He deplored the horrible errors in taste represented in such statements as, "A surgeon may be a whiz in the abdomen but a bull in the china shop when it comes to the tonsils."

Another common fault is the use of fancy writing employed mostly in the essay form.

The worst offenders in medical writing today are the neurologists, according to Dr. Fishbein: they have worked out a language exclusively their own. "The Freudians have a vocabulary and nothing else." The neurologists make use of a great number of eponyms which may mean a great deal to them and which, to a certain extent, may be permissible in a neurologic publication; but when they are writing for the general practitioner it is necessary to modify the vocabulary. Dr. Fishbein contrasted such writing with Parkinson's simple description of shaking palsy which he suggested would probably stand a great deal longer. He also depreciated the jargon of the surgical clinic which involves the use of such terms as "acute abdomen."

Dr. Fishbein said that although it is proper in a monograph to give a complete résumé of the literature up to that time, it is preferable even then to give a résumé only back to the last general résumé which has been given well. The scheme of writing should be to state the premise, set forth observations (leaving out everything which has not a direct bearing), then give a brief summary of what is being added to the literature that was not there before. Dr. Fishbein classed notes of thanks as an abomination.—*Proceedings of Staff Meeting of the Mayo Clinic*, May 16, 1928.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

State vs. M. Gabrielson

The above defendant, M. Gabrielson, has been maintaining an office at 4159 Washington Avenue, North, in the city of Minneapolis, Minn., for the past eight years. He has in the past been listed in the Minneapolis telephone directory as a physician and surgeon. The sign on the door at the above address reads: "Dr. M. Gabrielson—Rheumatism Specialist," and his statements sent to patients indicate that he treats all chronic diseases. Gabrielson is not licensed in this state under any of the healing arts.

After investigation a complaint was filed against Gabrielson for treating one Andrew Carlson of Minneapolis. Carlson had been troubled with a skin eruption on his leg and he went to Gabrielson for treatment; the treatment consisted of a liquid application to the disturbed area over a period of nine months with no resulting improvement; during this period Carlson persuaded his brother-in-law, C. O. Swenson of Minneapolis, to go to Gabrielson for treatment for a like ailment. Both of these patients are working in woodworking factories, and probably had some occupational ailment.

On Oct. 17, 1928, the defendant was brought into the Municipal Court of Minneapolis and entered a plea of not guilty. A hearing was set for October 31, but a

day or two before the date of the hearing we were informed that the defendant would waive his preliminary hearing, which he did, and was bound over to the district court. On November 1, the defendant entered a plea of not guilty in the district court and his trial was set for the seventh day of November. On November 7, however, the defendant entered a plea of guilty and the court continued the case until the tenth for sentence. The case was then continued from the tenth to the seventeenth; from the seventeenth to the nineteenth; from the nineteenth to the twentieth and finally on November 21, 1928, the defendant appeared in court for sentence.

The court sentenced the defendant to one year in the Minneapolis workhouse; ordered the defendant to serve 15 days of his sentence and if during the 15 days the defendant can make up his mind to close his place and keep it closed, the court will entertain an application for a suspension of the balance of the jail sentence and place the defendant on probation, on condition that his place is kept closed and that he refrain from practicing healing.

Judge Wm. C. Leary was on the bench in the disposition of this matter.

We have taken up with the telephone company the removal of Gabrielson's name from the listing of physicians and surgeons in the telephone directory and we are informed that the same would not appear in the new directory of Jan. 1, 1929.

A. E. Comstock, M.D.,
Secretary.

OBITUARY

Willard B. Pineo*
1858–1928

Dr. Willard B. Pineo, a resident of Minneapolis for 45 years, died Nov. 13, 1928, after an illness of six months. Funeral services were in charge of the Scottish Rite, of which order he was a member.

Dr. Pineo was born April 22, 1858, in Columbia Falls, Maine, and his preliminary education was received at Bucksport Seminary and Kent's Hill seminary in Maine. He came to Minneapolis in 1883 and after teaching school for six years he took up the study of medicine with Dr. F. A. Dunsmoor of Minneapolis, graduating from the Medical Department of the University of Minnesota in 1885, a member of the first medical class to go out from that institution and, prior to his death, the oldest alumnus.

Dr. Pineo pursued post-graduate studies in New York, Vienna, Paris and London. After five years in general practice, he took up the specialty of Eye, Ear, Nose and Throat, which he continued for 33 years.

Dr. Pineo was a Fellow of the American Medical Association and a member of Minnesota State Medical Association and of the Hennepin County Medical Society, having been secretary of the latter society in 1897-99 at the time when its meetings were held at the Public Library. He was also a member of the Academy of Ophthalmology, and had been a member of the Minneapolis City Hospital Staff and Secretary of the Asbury Hospital Medical Staff for many years. He was a 33 degree Mason, Past Master of Hennepin Lodge No. 4, and Wise Master of Rose Croix. He was a member of the Minneapolis and Lafayette Clubs.

He is survived by his wife. Dr. and Mrs. Pineo had resided for several years at the Leamington Hotel.

*Report of the Necrology Committee, read before the Hennepin County Medical Society at its meeting of December 3, 1928.

Theodore Tennyson*
1869–1928

Dr. Theodore Tennyson died in Los Angeles, California, Oct. 29, 1928. Burial took place at Lakewood Cemetery, Minneapolis, November 5, with members of the Scottish Rite in charge.

Dr. Tennyson was born at Haugesund, Norway, June 30, 1869, and came to Minneapolis with his mother in 1883. He learned the English language and studied pharmacy, engaging in business in Tacoma, Washington, after completing his course.

After his marriage to Miss Ruse of Chicago he entered the Washington University (St. Louis) and was graduated from the Medical Department in 1898. After practicing at Appleton for five years he came to Minneapolis, where he practiced until retiring from active practice in 1927.

He was a member of the medical staffs of Swedish, Norwegian Deaconess, and Fairview Hospitals, and had been a member of the Scheldrup-Tennyson-Petersen Clinic since its organization.

Dr. Tennyson was a member of the Hennepin County Medical Society, Minnesota State Medical Association, and a Fellow of the American Medical Association; a member of the Sons of Norway, the Odin Club, and of the orders of Scottish Rite, Modern Woodmen and Elks.

His wife and three children, all of Minneapolis, survive him.

*Report of the Necrology Committee, read before the Hennepin County Medical Society at its meeting of December 3, 1928.

A PAGE FORUM OF THE COMMITTEE ON PUBLIC HEALTH EDUCATION

You and Your Society

Today's world works by organization. The men who complain that they have no interest in organized medicine—that they cannot get anything out of it, might well stop for a time and take stock of themselves as well as of organized medicine, its benefits, products and demands.

The County Society is as good as its members make it. Ask yourself how much effort you have put forth, as far as the County Society is concerned, to make it a success. Go a little further, apply the statement to the State Society—even further, to the American Medical Association. What degree of fraternal spirit, of co-ordinated effort, of mutual protection for the profession and for public health would exist if your contributions were the standard unit of measure?

Did it ever occur to you because you have not been asked to take part in the programs of your County Society that possibly your own attitude of indifference may be keeping you from just recognition in your community, and, what is more to the point, that probably you have locked in your own silence some item of knowledge, some vital experience of your own, that might be of tremendous importance to the health of the community or to the preservation of some individual life. What you have learned about your community, your confrères deserve to know in so much as generalities are affected.

If you fail to show enthusiasm for your work, if you are not willing—eager—to discuss with your fellow workers, angles and details of each fresh presentation of old subjects that come under your observation, you are apt to find yourself at the end of the profession.—Illinois Medical Journal, April, 1928.

THE FOLLOWING ARE REASONS WHY PHYSICIANS SHOULD BE MEMBERS OF THEIR COUNTY MEDICAL SOCIETY AND THE MINNESOTA STATE MEDICAL ASSOCIATION:

1. Modern medicine is keeping stride with scientific research. Membership in the State Society gives you a scientific standing.

2. Membership is required for admission on the staff of class "A" hospitals according to the constitution and by-laws of the National Hospital and College of Surgeons Associations.

3. Membership in the State Society provides you with one of the leading medical publications in the country and protects the profession of the state against the unscrupulous actions of all the quacks.

4. Membership in the State Society permits you to discuss medical problems with the leaders of the profession.

5. Membership in the state and local society is necessary before you can affiliate with the reputable professional societies of the country and with the American Medical Association, and gives you entrance to medical societies in any state of the United States.

6. Membership in the State Society gives the opportunity to get indemnity insurance at a reduced rate.

7. Membership in the State Society, of the doctors who are members of the medical staffs of their organizations, is required by most insurance, industrial and railroad companies.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL ASSOCIATION

The Committee on Scientific Assembly met in St. Paul Saturday, December 8, 1928. The sixty-first annual meeting of the Minnesota State Medical Association will be held in St. Paul, May 13, 14 and 15, 1929. Indications are that there will be an excellent program. In addition to the regular scientific program, many dry clinics have been planned. There will also be scientific and commercial exhibits of unusual interest.

RICE COUNTY MEDICAL SOCIETY

The Rice County Medical Society held its regular meeting Tuesday evening, November 27, in the Stuart Hotel, Northfield. A chicken dinner was served at 7 o'clock.

Dr. G. B. Eusterman, of the Mayo Clinic, favored the society with an illustrated lantern slide lecture on the recent developments in diagnosis and treatment of cholecystic diseases.

Dr. Orin P. Thorson, Northfield, was elected to membership.

Election of officers resulted as follows: President, Dr. Warren Wilson, Northfield; Vice-president, Dr. Neil S. Dungay, Northfield; Second Vice-president, Dr. F. J. Lexa, Lonsdale; Secretary-Treasurer, Dr. C. J. Plonske, Faribault.

Dr. P. A. Smith, Faribault, was elected delegate to the state meeting and Dr. W. S. Warren, Faribault, alternate. Drs. J. Moses, Northfield, Carl Traeger, Faribault, and W. H. Rumpf, Faribault, were elected as censors.

The following members were appointed to act as a publicity committee: W. H. Robilliard, S. B. Haessly, Faribault, and F. M. Babcock, Northfield.

Dr. W. H. Robilliard, Dr. J. M. Murdoch, Dr. F. E. Huxley, Dr. J. Moses and Edwin Bache of Kenyon were appointed on a committee for Hospitals and Medical Education and are to arrange for University medical courses.

A resolution concerning Dr. W. P. Lee, formerly of Northfield, who died from cancer in Winthrop, Maine, was sent to Mrs. Lee and children.

C. J. PLONSKE, M.D.
Secretary.

MINNESOTA SOCIETY OF INTERNAL MEDICINE

The Minnesota Society of Internal Medicine held its regular semi-annual meeting at Rochester, Minnesota, Nov. 15, 1928. Thirty-six members and many guests were present. A group of members from Minneapolis and St. Paul went to Rochester by the new tri-motored Ford Plane. There were no casualties except for some rather disagreeable gastro-intestinal upsets. The morning and afternoon were given over to the scientific program, while the evening was devoted to the business meeting and dinner.

Dr. H. O. Altnow of Minneapolis and Dr. E. T. Herrmann of St. Paul were elected to membership. The 1928 research prize of $250.00 was awarded to Dr. Max Seham of Minneapolis, for his investigations on the relationship between fatigue, malnutrition, and nervousness in children. Dr. L. G. Rowntree was elected president for 1929, Dr. E. L. Tuohy vice president, and Dr. E. L. Gardner secretary-treasurer.

The next meeting is to be held during the spring in Minneapolis.

RAMSEY COUNTY MEDICAL SOCIETY

Election of officers for the year 1929 was held at the dinner meeting of the Ramsey County Medical Society at the Saint Paul Athletic Club, Nov. 26, 1928.

Dr. W. H. Cole was elected president, Dr. F. C. Schuldt vice-president, and Dr. Albert G. Schulze secretary-treasurer.

AMERICAN COLLEGE OF SURGEONS

Announcement has been made by Dr. Franklin H. Martin, director general of the American College of Surgeons, that the next annual Clinical Congress of the College will be held in Chicago, Illinois, October 14 to 18, 1929.

REGISTRY FOR PHYSICAL THERAPISTS

The Minnesota chapter of the American Physiotherapy Association, at the request of a number of physicians, is establishing a registry for women adequately trained in physical therapy.

The names supplied through this registry are those of members of the American Physiotherapy Association, an organization recognized by the American Medical Association.

The qualifications for active membership in the American Physiotherapy Association are one year's practice in physical therapy within two years of graduation from:

(1) An approved school of Physical Therapy.

(2) An approved school of Physical Education and satisfactory completion of an approved course in Physical Therapy.

(3) An approved school of Nursing and satisfactory completion of an approved course in Physical Therapy.

There is no charge for the services of the registry, the object of establishing it being to give the doctors throughout the state an opportunity of obtaining a trained physical therapist. The coöperation of the medical profession in using the registry will help to maintain the necessary standards in this branch of work. The present registrar is Miss Martha Hindman, 415 Hamm Building, St. Paul, Minnesota, Telephone Cedar 4581.

Application form for membership in the association may be obtained from the state secretary, Miss Ann Kelley, Mayo Clinic, Rochester, Minnesota.

OF GENERAL INTEREST

Dr. William Liffrig, who recently completed his internship at Ancker Hospital, Saint Paul, is located at Goodhue, Minnesota.

Dr. Temple Burling, formerly of Minneapolis, is at the Pratt Hospital in Pocoson, Maryland, where he is engaged in the study of psychiatry.

Dr. A. P. Campbell, formerly of the Philadelphia General Hospital, is now located at Red Wing, Minnesota, associated with Drs. A. E. Johnson and S. H. Anderson.

It is interesting to note that the four range towns in Minnesota recently chose physicians as mayors. In Hibbing, Dr. H. R. Weirick, pioneer physician of the Rood Hospital staff, was chosen; in Chisholm, Dr. E. H. Nelson; in Buhl, Dr. A. W. Shaw; and in Gilbert, Dr. Frederick Barrett.

In the first eleven months of the year 1928 some forty-two persons died as a result of automobile accidents in Saint Paul as compared with only nineteen deaths from all contagious diseases during that period. The nineteen deaths were tabulated as follows: Diphtheria, 96 cases with 3 deaths; scarlet fever, 482 cases with 1 death; whooping cough, 1,156 cases with 7 deaths; measles, 128 cases with no deaths; anterior poliomyelitis, 23 cases with 4 deaths; meningitis, 11 cases with 4 deaths; small-pox, 6 cases with no deaths; and chicken-pox, 1,100 cases with no deaths.

NEW AND NON-OFFICIAL REMEDIES

The following articles have been accepted by the Council on Pharmacy and Chemistry:

ARLINGTON CHEMICAL CO.
- Western Water Hemp Pollen Extract-Arlco
- Spiny Amaranth Pollen Extract-Arlco

E. BILHUBER, INC.
- Metrazol
  - Metrazol Ampoules, 1 c.c.
  - Metrazol Tablets

THE GILLILAND LABORATORIES, INC.
- Rabies Vaccines-Gilliland (Semple Method)

H. A. METZ LABORATORIES, INC.
- Salyrgan
  - Ampules Salyrgan Solution, 1 c.c.
  - Ampules Salyrgan Solution, 2 c.c.

E. R. SQUIBB & SONS
- Antipneumococcic Serum, Type I, 50 c.c. gravity container
- Antistreptococcic Serum-Squibb, 50 c.c.. gravity container
- Squibb's Mint-Flavored Cod Liver Oil

TRUTH ABOUT MEDICINES

Mulford Acidophilus Bacillus Blocks.—A culture of *B. acidophilus* (Y strain), embedded in a 2 per cent agar jelly containing milk powder, lactose, d-glucose and sucrose, and marketed in the form of chocolate covered cubes, each of which contains approximately 150 billion viable organisms (*B. acidophilus*) at the time of issue. For a discussion of the actions and uses of bacillus acidophilus see Lactic Acid Producing Organisms and Preparations, New and Non-official Remedies, 1928, p. 228. H. P. Mulford Co., Philadelphia. (Jour. A. M. A., November 3, 1928, p. 1375.)

Phentetiothalein Sodium.—Phenoltetraiodophthalein Sodium.—Phentetiothalein sodium contains from 56 to 59 per cent of iodine. It is used for the roentgenologic examination of the gallbladder and simultaneous test of hepatic function. Following the intravenous injection, the solution appears in the normal gallbladder in sufficient concentration to cast a shadow to the roentgen rays and if the liver is damaged it is retained in the blood in amounts indicative of the extent of impairment.

Iso-Iodeikon.—A brand of phentetiothalein-N. N. R. It is marketed in 2.5 Gm. ampoules. Mallinckrodt Chemical Works, St. Louis. (Jour. A. M. A., November 17, 1928, p. 1549.)

Ephedrine Hydrochloride-Squibb.—A brand of ephedrine hydrochloride-N. N. R. (New and Non-official Remedies, 1928, p. 175). E. R. Squibb & Sons, New York

Syrup Ephedrine Hydrochloride-Swan-Myers.—A syrup containing ephedrine hydrochloride-Swan-Myers (New and Non-official Remedies, 1928, p. 176) 0.2195 Gm., in 100 c.c. (⅓ grain per fluidrachm) and alcohol 12 per cent. Swan-Myers Co., Indianapolis.

Potassium Bismuth Tartrate with Butyn-D. R. L., 02 c.c.—Each c.c. contains potassium bismuth tartrate-D. R. L. (New and Non-official Remedies, 1928, p. 110) 0.1 Gm.; butyn, 0.6 per cent; and metaphen, 0.01 per cent suspended in expressed oil of almonds. Abbott Laboratories, North Chicago.

Ampoules Metaphen Solution 1:1,000, 10 c.c.—1 part metaphen (New and Non-official Remedies, 1928, p. 274) dissolved in 1,000 parts of water by means of sodium hydroxide (four molecules of NaOH for every molecule of metaphen). Abbott Laboratories, North Chicago.

Erysipelas Streptococcus Antitoxin (Lederle) Refined and Concentrated.—An erysipelas streptococcus antitoxin (New and Non-official Remedies, 1928, p. 353), prepared by immunizing horses by subcutaneous injections of the toxic filtrate obtained from broth cultures of the erysipelas streptococcus, or by intravenous injection of cultures of the erysipelas streptococcus obtained from typical cases of erysipelas. It is marketed in packages of one syringe containing one basic dose. Lederle Antitoxin Laboratories, New York.

Ethylhydrocupreine.—This is a synthetic derivative of cupreine and is closely related to quinine. It has the antimalarial and anesthetic action of quinine. Toxic symptoms, however, are more liable to occur than with quinine. Clinical investigation indicates that the drug may be of value in the treatment of lobar pneumonia, if a sufficient amount can be administered sufficiently early without untoward effect. To avoid such effect, it is proposed to secure slow absorption through

the administration of the free base by mouth. The drug has a definite value in the treatment of pneumococci infections of the eye.

Optochin Base.—Optochin.—Ethylhydrocupreine.—For a discussion of the actions and uses see ethylhydrocupreine. Optochin Base is supplied in powder and in two grain tablets. Merck & Co., Inc., Rahway, N. J.

Optochin Hydrochloride.—The hydrochloride of ethylhydrocupreine. For a discussion of the actions and uses see ethylhydrocupriene. For application to eye and instillation into the conjunctival sac, a freshly prepared 1 or 2 per cent solution is used. It is not recommended for oral administration. Merck & Co., Inc., Rahway, N. J.

Tablets Protargentum-Squibb, 4.6 grains.—Each tablet contains 4.6 grams of protargentum-Squibb (New and Non-official Remedies, 1928, p. 397). E. R. Squibb & Sons, New York.

Tablets Solargentum-Squibb, 4.6 grains.—Each tablet contains 4.6 grains of solargentum-Squibb (New and Non-official Remedies, 1928, p. 398). E. R. Squibb & Sons, New York.

Capsules Ephedrine Hydrochloride-Abbott, ⅓ grain.—Each capsule contains ⅓ grain of ephedrine hydrochloride-Abbott (New and Non-official Remedies, 1928, p. 176). Abbott Laboratories, North Chicago, Ill.

Antimeningococcus Serum Concentrated-Lilly.—An antimeningococcus serum (New and Non-official Remedies, 1928, p. 359) refined and concentrated by the Banzhaf method. It is marketed in packages of one 1 c.c. double ended vial with apparatus for intraspinal injection. Eli Lilly & Co., Indianapolis.

Antistreptococcus Serum, Purfiied and Concentrated-Lilly.—A polyvalent antistreptococcus serum (New and Non-official Remedies, 1928, p. 361) prepared by immunizing horses against virulent strains of the various streptococcus groups. It is marketed in packages of one 10 c.c. syringe and in packages of one 10 c.c. vial. Eli Lilly & Co., Indianapolis.

Capsules Ephedrine Sulphate-P. D. & Co.—Each capsule contains 0.025 Gm. of ephedrine sulphate-P. D. & Co. (New and Non-official Remedies, 1928, p. 178). Parke, Davis & Co., Detroit. (Jour. A. M. A., November 24, 1928, p. 1633.)

Tetanus Antitoxin.—This tetanus antitoxin, concentrated (New and Non-official Remedies, 1928, p. 356), is also marketed in a syringe containing 20,000 units. Eli Lilly & Co., Indianapolis. (Jour. A. M. A., October 13, 1928, p. 1109.)

Diphtheria Toxin for the Schick Test.—This diphtheria immunity test (New and Non-official Remedies, 1928, p. 291) is also marketed in packages of two 10 c.c. vials, sufficient for 100 test doses. Schick Test Control is also supplied in packages of one 10 c.c. vial, sufficient for at least 100 tests. H. K. Mulford Co., Philadelphia.

Tetanus Antitoxin Globulin.—This tetanus antitoxin, concentrated (New and Non-official Remedies, 1928, p. 356), is also marketed in piston syringe containers, containing 20,000 units. Parke, Davis & Co., Detroit.

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

MEDICINE

SUPERVISORS:

F. J. HIRSCHBOECK,
205 W. 2nd STREET, DULUTH

THOMAS A. PEPPARD,
LA SALLE BLDG., MINNEAPOLIS

THE MEASUREMENT OF THE ULTRA-VIOLET RAYS OF SUNLIGHT. Leonard Hill (First International Conference on Light, Lausanne, Switzerland, Sept., 1928). The rays are measured by comparing the color of a standard solution of acetone and methylene blue which has been exposed to sunlight or skyshine with the color of eight standard tubes. Exposed to a constant source of ultra-violet rays the fading is proportional to the time of exposure.

The ultra-violet rays come mostly from the skyshine. Taking the diffuse ultra-violet from the sky as 100, that from the direct sun was found by Dorno to be:

Height of Sun	U.V. Radiation
20′	12,3
40′	47,6
60′	85,1

Screening off the direct sun makes only a small difference. Ultra-violet ray treatment can then be given by means of skyshine with the hot direct sun screened off by an umbrella.

There is a close correspondence between the acetone blue fading and the erythema producing power of the sun. Dorno says that at Davos wave-lengths most active in producing erythema are only to be found from 8 a. m. to 4 p. m. from May to September. Erythema production, bactericidal effect, the changing of oxy- into methemoglobin, the activation of ergosterol and the formation of Vitamin D are associated with the shorter ultra-violet rays of the sun. With the sun low in the heavens, there are no very short rays. Ultra-violet intensity in Scotland is less than in South England. The average in Davos is higher. Various readings obtained in localities widely scattered are given. In Manhattan, Kansas, readings, varying from 2 in January to 16 in July, are reported. In Egypt (Assuan) readings of 16 to 17 for the 24 hours were reported during the winter months. During the winter, Assuan receives more ultra-violet rays than Davos. Clear atmosphere

and skyshine come into play in giving high ultra-violet readings. The more hazy the sky the less as a rule the ultra-violet reading.

Comparisons were made between the acetone-blue and the photographic method in which the Eder photometer is used. Hill does not consider the latter a reliable method for measuring the biological effect of ultra violet light.

Tables are appended showing daily variations in ultra-violet rays in various localities.

A. T. LAIRD, M.D.

PROLONGED TREATMENT IN NEUROSYPHILIS: H. C. Solomon, M.D., and A. Berk, M.D., Boston, Mass. (Amer. Jour. of Syphilis, 1928, XII, No. 4). The authors present 20 selected cases giving in brief the condition of the patient before and after treatment and the amount and duration of treatment while the patients were under their care, with their conclusions.

The combined time these patients were treated by the authors was 94 years. Triparsamide was administered 1,710 times; arsphenamine, 791 injections; mercury, 455 injections; 22 intracistern injections; 85 intraspinal injections; 11 intraventricular injections, 14 bismuth injections, and 38 malarial paroxysms induced. Spinal drainage was done 235 times. Spinal fluid tests were made 623 times and blood Wassermann tests 2,415 times. If all these figures are divided by 20 one gets the average treatment, examinations and duration of treatment of each patient.

The authors' conclusions as to results are tinctured with a ray of hope not apparent to the reviewer. The important lesson to be gained from the review of the cases is not mentioned by the authors, that is—that syphilis should be treated thoroughly before it is necessary to consult the neurologist and before paresis and tabes occur. If these patients were private patients they and all their relatives must now be more than poverty stricken. If they were charity patients much public money has been wasted. It hardly seems necessary that others should repeat these experiments in human endurance and therapy. Common sense has been termed the knowledge of yesterday. Perhaps! We wonder what may be the common sense of tomorrow.

J. M. ARMSTRONG, M.D.

THE DURATION OF LIFE IN PULMONARY TUBERCULOSIS WITH CAVITY: Harry L. Barnes and Lena R. P. Barnes (Amer. Rev. of Tuberc., 1928, XVIII, 412). The end-results on nearly 1500 cavity cases admitted to the State Sanatorium at Wallum Lake, R. I., in the last 23 years are summarized in a statistical paper.

Of 616 cases diagnosed by the *x*-ray as having cavities larger than 2 c.m., 99 per cent had positive sputum, 97 per cent of the cavities when only one cavity was present above the upper border of the third rib. The percentage of survivors at the end of the first year was four times as great when the cavities were between 2 and 3 c.m. in size as when they were between 10 and 15 c.m. in size. About 90 per cent of these having cavities larger than 7 c.m. died within a year. Cases which showed marked calcification in the cavity walls had 3 times as many survivors at the end of 3 and 5 year periods as the ordinary cavity cases.

Fifty-three *x*-ray films are compared with necropsy reports. In fifty of these, cavities were found of which location was confirmed by the postmortem examination. Of 651 cavity patients, two have lived more than 20 years, five more than 15 years and thirty-two more than 10 years. In nine cases the *x*-ray signs of cavity and the mottled areas in the surrounding lung tissue cleared. All of these patients are now working and are in good health. Of the whole series of 1,454 cases, 80 per cent were dead within a year; only 5 per cent were alive after 15 years. The percentage of survivors after three and five year periods was five times as great among patients with pulse under 90, and eight times as great after five years among patients with temperatures under 99 as among those whose pulse and temperature rates were higher.

Various other interesting statistics are given.

A. T. LAIRD, M.D.

EYE, EAR, NOSE AND THROAT

SUPERVISORS:

VIRGIL J. SCHWARTZ,
PHYS. & SURG. BLDG., MINNEAPOLIS

ARTHUR C. DEAN
CROOKSTON CLINIC, CROOKSTON

A SIMPLIFIED METHOD FOR *X*-RAY STUDIES OF THE ACCESSORY NASAL SINUSES: H. Caultier Todd, Laryngoscope, 1928, 38, 688. The nose is cleaned with a mild alkaline douche. Apply solution of 1 per cent ephedrin and 1 per cent cocaine to nasal mucosa. After shrinking and anesthetization has occurred apply suction to drain sinuses.

Place the patient upon the *x*-ray table in a dorsal position and have the angle of occiput with trunk at a little less than 45 degrees. Drop about ½ to 1 dram of lipiodol in each nostril while the patient is breathing through his mouth constantly.

Instruct the patient to seize the nose tightly between the thumb and forefinger of the right hand and exhale deeply. Then close the mouth tightly and have the patient attempt to pull air into his lungs through the tightly closed nose. This produces a vacuum in the sinuses. Then suddenly open the nose. Repeat this procedure 5 to 15 times, adding more lipiodol as needed. The sinuses will fill with lipiodol. Before taking *x*-ray pictures, clear the nasal mucosa of lipiodol by the use of sterile cotton on nasal applicators. *X*-ray pictures must be taken postero-anteriorally and Granger angles may be used.

ARTHUR C. DEAN, M.D., F.A.C.S.

REMARKS REGARDING THE DISCUSSION UPON THE ETIOLOGY AND TREATMENT OF HYPOPYON ULCER: G. Herbert Burnham, Toronto (British Journal of Ophthalmology, 1928, XII,

522). A corneal ulcer which is associated with hypopyon is always accompanied by more or less iritis and conjunctivitis. "The Combined Treatment" comprises the internal administration of mercury and of sodium and bromide, together with the hypodermic injection of pilocarpine.

A typical case of the kind above described is managed as follows: Argyrol or neosilvol, gr. XX to one dram, is freely instilled into the eye once daily and is followed in a few minutes by atropin, gr. ½ to the dram; the first is used to control the conjunctivitis, and the second, the pupil. Later they may be discarded. A series of twenty hypodermic injections of pilocarpine is given, one each day, beginning with gr. 1/12 and gradually increasing, if tolerated, to gr. ¼ or even to gr. 1/3.

During the series the mercury is administered twice daily a half hour after eating and the sodium iodide and bromide twice daily one hour after eating. *Between* series these medications are given three times daily. The eye soon feels better, the ulcer becomes more localized and the remaining cornea clearer, so that when the series is completed much improvement is noted.

After four to six weeks a series of ten injections of pilocarpine is again given and this is repeated from time to time until the cornea has returned as nearly to normal as possible. Unless very far advanced, a complete recovery can thus be obtained. However, if a clear cornea is impossible because of a nebula or a leucoma, still the ocular contour will not be changed so as to end in a staphyoma and possibly enucleation.

The results obtained with this treatment over a period of many years have been so uniformly successful that none other has been employed.

(Detailed information regarding the entire procedure may be found in the volume "'The Combined Treatment' of Diseases of the Eye," by G. Herbert Burnham, published by H. K. Lewis, 136 Gower Street, London, 1906.)

VIRGIL J. SCHWARTZ, M.D.

DETECTION OF MALINGERING OF UNILATERAL DEAFNESS: B. M. Becker, Laryngoscope, 1928, 38, 677. To the shallow cup of a Bowles' stethoscope a piece of soft rubber tubing, 12 inches long, is attached. In the distal end of the tube, insert the metal or hard rubber bifurcated piece, and to each end attach a soft rubber tube, one 12 inches in length, the other 24 inches, fitted with proper size ear pieces.

The test consists in first ascertaining that the patient hears distinctly the ticking of any of the instruments through the longer tube when it is inserted in his normal ear, and the diaphragm of the stethoscope is placed directly on the surface of the ticker or in its immediate vicinity.

The test depends upon two facts, either of which can be used for testing purposes. 1. The first principle is that when tubes of unequal length are used and we listen to anything through them, the sound will always be lateralized on the side of the shorter tube. The sound through the longer tube is completely masked so that we are aware of monaural hearing, whereas the hearing is actually binaural. 2. The second element in the test depends upon the fact of binaural hearing. For when you pinch or compress the longer tube through which apparently no sound reaches the ear, one immediately becomes aware of a decided change in the sound in the opposite ear, due no doubt to the fact that binaural hearing has been converted into monaural hearing.

The indirect method consists in that we apparently test the normal ear. The doctor stands behind the patient and inserts the shorter tube in the normal ear, and the longer tube in the supposedly deaf ear. Assuming the left is normal, the right deaf; apply the stethoscope to the watch, etc., and asked the patient if he hears anything, and where. He will promptly answer that he hears the tick of the watch in the left ear. Now you ask the patient to tell you when he notices a change in sound. You compress the longer tube. He says that the sound changed; it is less pronounced and seems to approach nearer the eardrum. Then you know he is malingering, for if the right ear is deaf there is no change in sound perceived through the shorter tube. If the patient perceives no change in sound, we may resort to the direct method.

The order of the tubes is reversed, the short one in right ear, the long one in opposite. You ask the patient the same question. If he says he hears nothing, for he hears nothing with the normal ear, and he cannot commit himself by admitting that he hears the sound in the deaf ear, then we know he is malingering. But if his right ear is deaf, he will hear the sound distinctly through the longer tube. If he is a cunning malingerer and in answer to the question he states that he hears the sound in the left ear, then you gradually compress the longer tube, thereby cutting off all sound from left ear, and if he still hears it, then he is exposed. You may compress the longer tube prior to insertion and ask if he hears a sound. If he hears it, then he is exposed; if not, you gradually decompress tube, and if he still does not hear it, then he again has been exposed. Thus by compression and decompression of longer, or even of short tube, before or after insertion you may modify the test to suit the particular occasion.

ARTHUR C. DEAN, M.D., F.A.C.S.

PEDIATRICS

SUPERVISORS:
CHESTER A. STEWART,
LA SALLE BLDG., MINNEAPOLIS
ROY N. ANDREWS,
MANKATO CLINIC, MANKATO

SHOE-DYE POISONING: John Aikman, M.D. (Amer. Jour. of Diseases of Children, June, 1928). The outstanding symptom is general cyanosis, which is as marked as in congenital cardiac disease. This begins from one-half to several hours after the shoes are put on. It is accompanied by general weakness, chills, head-

ache, vertigo, somnolence, nausea and occasionally by stupor. The pulse rate is rapid.

Poisoning is produced by shoe dye applied to tan shoes to produce a black or brown. The poison is absorbed through the intact skin and little if any discoloration may result.

If the shoes are removed the cyanosis begins to decrease but may still be present twelve hours later. While the condition is usually of only a few hours' duration, two deaths are reported.

The toxic agent is due to either aniline or nitrobenzene used as a solvent for the dye.

If shoes are dyed, they should be well aired for several days before being worn.

The active treatment consists of a thorough bath and rest in bed. Inhalations of oxygen may be used if the condition is extreme.

R. N. ANDREWS, M.D.

INITIAL FEVER IN TUBERCULOSIS: Arvid Wallgren, M.D." (Amer. Jour of Diseases of Children, 1928, 36, 702). In 1916, Herbert Koch described what he called initial fever in tuberculosis. He had in mind a brief period of fever at the particular time that allergy develops after tuberculous infection has taken place.

It is customary to consider carefully the diagnosis of tuberculosis in all continued and obscure conditions of fever in childhood.

Doubt has existed regarding the occurrence of initial fever in older children. This, the author thinks, is because a symptom often accompanying initial fever in older children, namely, erythema nodosum, has not been fully understood.

After tuberculous infection has taken place, several weeks go by before the children become allergic, and, as a rule, the allergic state develops without causing any obvious changes in the health of the children. In a certain number of children, however, the reaction between the virus and the body develops rather sharply as allergy comes on; the time of the appearance of allergy in these cases may be marked by a longer or shorter period of fever. Some of the children who react in this way, at the same time may develop erythema nodosum.

Epstein, who critically investigated the observations at hand concerning the period of incubation in tuberculosis, found that the limits of the period are from three to seven weeks, which time corresponds closely to the interval between infection and the development of erthyema with fever which has just been cited.

The fact that the fever associated with the erythema develops at an interval after tuberculous infection which corresponds closely to the incubation period in tuberculosis indicates strongly that this fever is identical with the initial fever in smaller children.

If tests are made with larger doses of tuberculin, a positive reaction may be obtained long before the Pirquet test is positive, that is, long before the development of the fever.

The fever and its intensity do not appear necessarily to be dependent on marked anatomic changes or even on demonstrable changes, and for this reason it appears probable that an initial fever may result solely from the allergy, as such, and as an expression of the general increase in the reactivity of the body at this time.

R. N. ANDREWS, M.D.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

BOOKS RECEIVED FOR REVIEW

ACUTE INFECTIOUS DISEASES. Jay Frank Schamberg, M.D., and John A. Kolmer, M.D., Dr.P.H., D.Sc. 2nd edition. 892 pages. Illus. Cloth, $10.00. Philadelphia: Lea & Febiger, 1928.

SERUM DIAGNOSIS BY COMPLEMENT-FIXATION. John A. Kolmer, M.D., Dr.P.H., D.Sc., LL.D., Prof. of Pathology and Bacteriology, Graduate School of Medicine, University of Pennsylvania. 583 pages. Illus. Cloth, $7.00. Philadelphia: Lea & Febiger, 1928.

GENERAL MEDICINE. George H. Weaver, M.D., et al. 832 pages. Illus. The Year Book Publishers, 1928. 304 So. Dearborn, Chicago, Ill.

OSLER'S MODERN MEDICINE, GENERAL INDEX. Sir William Osler, Bart., M.D., F.R.S. 126 pages. Not Illus. Lea & Febiger, 1928. Philadelphia.

CRITERIA FOR THE CLASSIFICATION AND DIAGNOSIS OF HEART DISEASE. Joseph H. Bainton, M.D., W. C. Munly, M.D., M.C., U.S.A., Robert L. Levy, M.D., and Harold E. B. Pardee, M.D., Chairman. Committee appointed by the Heart Committee of the New York Tuberculosis and Health Association. 92 pages. Price, $1.50. New York: Paul B. Hoeber, 1928.

Because of the great amount of research work that is being done on heart disease, it is necessary that the terms used and the diagnoses made be standardized so that there may be no confusion. This is especially important in view of the fact that a considerable amount of this research work is of a statistical nature. These statistical reports are coming from various parts of the country. If they are to be of practical value, the fundamental material used must be clearly defined so that there may be "uniformity of nomenclature and uniform criteria for using the nomenclature."

In 1923, the New York Heart Association prepared a classification for labeling diseases of the heart. This classification has been used by heart clinics throughout the country. The present book was written to establish definite criteria for making diagnoses in accordance with this classification. The book was prepared by the above named committee appointed by the Heart Section of The New York Tuberculosis and Heart Association.

The first chapter of the book presents the classification for nomenclature prepared in 1923. The remainder of the book takes up the more important criteria for making each diagnosis. This section is divided in accordance with the classification into three divisions, etiological, anatomical, and physiological. Each diagnosis is clearly defined and the most important diagnostic criteria are given for making each diagnosis. A diagnosis made in accordance with this classification gives a complete picture of the heart condition described, not only from a structural point of view but also from an etiological and functional standpoint.

This monograph will prove of great practical value. It is a fundamental work clearly and simply presented. Not only is this a handbook for daily use in the heart clinic but it will be found exceedingly valuable and interesting to any one concerned with the study of diseases of the heart.

M. J. SHAPIRO, M.D.

OPERATIVE SURGERY. J. Shelton Horsley, M.D., F.A.C.S., Attending Surgeon, St. Elizabeth Hospital, Richmond, Virginia. 756 illustrations. 876 pages. St. Louis: C. V. Mosby Co.

The author has wisely incorporated, in all editions of his text on operative surgery, the importance of the preservation of physiological function and the interpretation of biologic processes that follow surgical operations. More than a mere knowledge of anatomy is necessary in surgery as it is essential to conserve and restore physiologic function of tissues involved. Pathology, of course, must be removed, but an attempt must always be made to restore tissue function. The author considers these points well in every type of operation described.

The third edition contains many good additions. The use of colloidal lead in the treatment of cancer is taken up in detail. A new partial gastrectomy with a modification of Billroth I and II is fully described, also describing total gastrectomy. The illustrations are elaborate and complete, with excellent description of all operations to the minutest detail.

Among other new things incorporated into the edition are the syringe method of blood transfusion, a new technic nephropaxy, hypospadias, skin transplantation and repair of cleft palate.

The book is well written, containing chiefly accepted procedures, and is a fine addition to other texts on operative surgery.

A. E. NAEGELI, M.D.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS EXAMINATION REPORT, OCTOBER, 1928.

LICENSED BY EXAMINATION

NAME	SCHOOL AND DATE OF GRADUATION	ADDRESS
Bonesteel, Henry T. S.	U. of Colo., M.D., 1926	Mayo Clinic, Rochester, Minn.
Damm, Walter Philip	U. of Iowa, M.D., 1927	961 Selby Ave., St. Paul, Minn.
Davison, Hugh Loyd	U. of Pa., M.D., 1924	Irwin Apt. No. 24, Rochester, Minn.
Davison, Richard Milton	U. of Minn., M.B., 1928	University Hosp., Minneapolis, Minn.
Emmons, William Frank	McGill, M.D., 1924	Mayo Clinic, Rochester, Minn.
Fortier, George M. A.	U. of Minn., M.B. 1928	St. Joseph's Hosp., St. Paul, Minnesota.
Fulcher, Oscar Hugh	U. of Va., M.D., 1926	Mayo Clinic, Rochester, Minn.
Krantz, Clement Ireneus	Johns Hopkins, M.D., 1924	Box 419, Duluth, Minn.
Lacy, Nicholas Eugene	U. of Mich., M.D., 1926	Mayo Clinic, Rochester, Minn.
Langenbahn, Carl Joseph	Northwestern, M.D., 1928	Ancker Hospital, St. Paul, Minn.
Magee, Henry Ross	U. of Manitoba, M.D., 1923	102-2nd Ave. S.W., Rochester, Minn.
Mohardt, John Henry	Northwestern, M.D., 1927	Mayo Clinic, Rochester, Minn.
Morehead, Dewey Edison	U. of Minn., M. B., 1924 & M.D., 1925	613 Wash Ave. S.E., Minneapolis, Minn.
Morton, Herschel B.	U. of Nebr., M.D., 1925	Mayo Clinic, Rochester, Minn.
Morton, Silvanus Archibald	Dalhousie Univ., M.D., 1926	Mayo Clinic, Rochester, Minn.
Pertl, Albert Louis	U. of Iowa, M.D., 1928	Abbott Hospital, Minneapolis, Minn.
Ray, Edward Hunt	Tulane, M.D., 1922	Mayo Clinic, Rochester, Minn.
Richards, Raymond Randolph	U. of Ill., M.D., 1928	Ancker Hospital, St. Paul, Minn.
Rude, Joseph Oscar	U. of Minn., M.B., 1928	Fairview Hospital, Minneapolis, Minn.
Ruedemann, Ehrhardt	U. of Mich. M.D., 1926	Mayo Clinic, Rochester, Minn.
Sarff, Oliver Elton	U. of Minn., M.B., 1928	Virginia, Minn.
Smith, Junius Penny	U. of Iowa, M. D., 1928	2528 Portland Ave., Minneapolis, Minn.
Swart, Howard Allan	Toronto Univ. M.B., 1926	103 6th Ave. N.W., Rochester, Minn.
Wall, C. Ragnar	U. of Minn., M.B., 1927	1386 Edmund St., St. Paul, Minn.
Yesko, Stephen Aloysius	Georgetown Univ. M.D., 1922	Mayo Clinic, Rochester, Minn.

LICENSED BY RECIPROCITY

Bateman, Clarence Virgil	Northwestern, M.D., 1925	Mountain Lake, Minnesota.
Daniels, Luman Elmer	Rush, M.D., 1921	918 Univ. Ave. S.E., Minneapolis, Minn.
Demo, Percy William	U. of Iowa, M.D., 1927	1717 1st Ave. S., Minneapolis, Minn.
Hall-Kent, Alcina Edith	Manitoba Univ., M.D., 1925	2215 Glenwood Ave., Minneapolis, Minn.
Larson, Milo Henry	Marquette, M.D., 1928	Browerville, Minn.
McEnaney, Clifford Thomas	St. Louis Univ., M.D., 1925	48 7th Street N.E., North St. Paul, Minn.
Marsh, Howard LaRue	U. of Ill., M.D., 1926	Eveleth, Minnesota.
Mattison, Percy A.	U. of Colo., M.D., 1927	Winona Clinic, Winona, Minn.
Powelson, Harry Clay	Ohio Univ., M.D., 1924	Mayo Clinic, Rochester, Minn.
Thompson, Fred Rush	U. of Ill., M.D., 1920	517 5th St. S.W., Rochester, Minn.

NATIONAL BOARD CANDIDATE

McCaughan, John Milton	Wash. Univ. Mo., M.D., 1926	Mayo Clinic, Rochester, Minn.

A SKETCH OF THE LIFE AND WORK OF LEONARDO DA VINCI

Leonardo da Vinci lived from about 1452 to 1519, just at the dawn of the great movement which restored the intellect of medieval Europe to a level almost as high as that which had prevailed in Athens nearly 2,000 years before. Hemmeter stated, of the work of Leonardo: "The fairly close study of the principal literary remains would take a competent master in mathematics, physics, engineering, anatomy, physiology, architecture, painting, sculpture and philosophy approximately twenty or twenty-five years."

Studies in anatomy: Leonardo possibly began his anatomic studies in order to perfect his art. In his time no such thing as systematic anatomy existed and the only books available were translations of Galen and Avicenna, whose versions of anatomy were, for the most part, based on animal dissections. It is only natural that he should have turned to active dissection in order to secure the desired information. In 1516 he prided himself on having made dissections of more than thirty human bodies. He is credited with having been the first to make topographic dissections and to use cross sections of the body; many of his drawings illustrate the organ grossly and then the corresponding cross sections.

Leonardo's studies of the muscles are especially fine; he well understood the mechanics of muscle action. Hopstock stated that he made models of the skeleton and represented the muscles with wires or tapes attached to the origin and insertion of the muscles and thus studied their action.

Some of his most brilliant and lasting contributions to anatomy appear in his work on the heart and circulatory system. His keen, searching mind was no doubt perplexed and baffled by the riddle of the circulation. Many of his statements relative to the circulation of the blood are clear-cut and convincing and one is tempted to enlarge on them and to accept them as proof that he had actually pierced through this enigma and understood the circulation. Most students of Leonardo agree, however, that he did not accomplish this and it is entirely possible that he had unwittingly accepted just enough of Galen's dogma to prevent him from reaching this goal.

In his drawings of the heart he represented the wall of the left ventricle as much thicker than that of the right. He emphasized the fact that the heart must be considered as being divided into four chambers; he accurately described and drew the papillary muscles and the chordæ tendineæ and showed how the latter attach to the edges of the atrioventricular valves, and he was the first to demonstrate the presence of the intraventricular moderator band which arises from the septum and attaches to the base of a papillary muscle. He studied the form of the aortic and pulmonary valves by pouring wax into them from above. He knew that their function was to prevent blood from rushing back into the heart and made calculations to show that three aortic cusps are more satisfactory than four, inasmuch as the angles would be weaker if there were more than three. By a very ingenious method he succeeded in making a glass cast of the heart and great vessels, by means of which he studied the currents entering and leaving the heart. He discussed the nature of the origin of the heart beat and finally decided that it is of spontaneous origin within the heart, possibly because he had noticed that the hearts of lower animals continue to beat after being removed from the body.

Studies in physiology: Physiology in the Fifteenth Century was about as it had been left by Galen, and the clean-cut statements of Leonardo, based on the finest inductive reasoning, come as a great light at the end of a long period of darkness. Some of his finest work dealt with the physiology of vision. He discovered that the image of external objects is inverted and reduced in size on the retina of the eye, and he is also credited with having been the first to discover the effect of light and of darkness on the size of the pupil.

He experimented on and grasped the importance of the spinal cord from his observations on frogs. He understood and evaluated the fundamental mechanism of the automatic or involuntary movements, and gave an almost perfect description of them.

No one has stated the problem of the ceaseless transformation of matter and energy with the resultant liberation of heat, which characterizes living animals, more clearly than Leonardo. He also observed the fact that an animal cannot live in air which is no longer able to support the flame of a candle.

Contributions to the methods of science: Leonardo fully appreciated the dangers of applying deductive and teleologic reasoning to the biologic sciences. Careful experimentation was for him the starting point of all science. He formulated the principle and made use of the inductive method of reasoning more than 100 years before Francis Bacon. Leonardo was fully three centuries in advance of his time but his works were lost for nearly 200 years after his death. He could never bring himself to arrange and edit his massive collection of notes for publication, and his works on anatomy, as we know them today, were probably never intended for publication but were notes and drawings made as he dissected. However, as Gilberto Govi has said, "Leonardo was the inventor of the system to which Galileo, a century later, owed his finest discoveries; the system to which Bacon, who taught it without understanding it, is indebted for his reputation as the restorer of the sciences."—C. WILHELMJ, M.D. Proceedings of the Staff Meetings of the Mayo Clinic, May 2, 1928.

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